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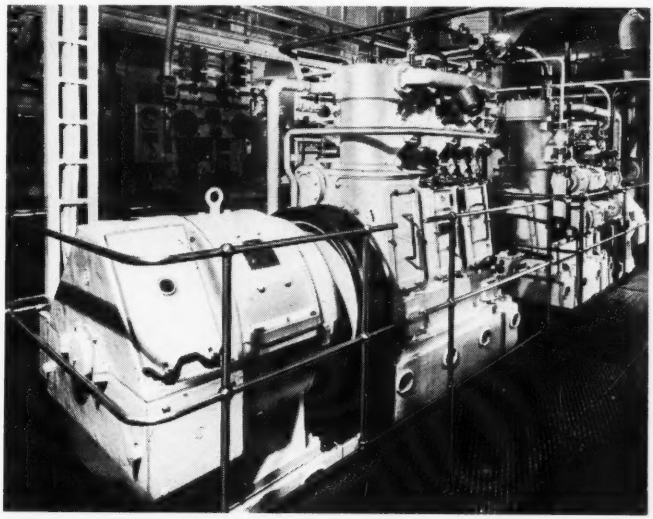
ALL-ELECTRIC ESTATE

ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXIII. No. 3425 JULY 16, 1943 6d. WEEKLY



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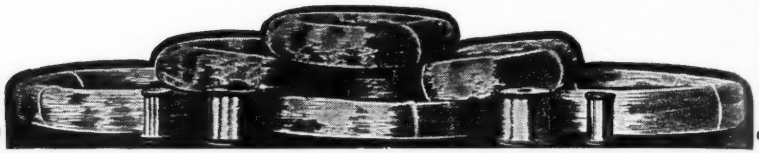

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ELECTRICAL REVIEW

July 16, 1943

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1943

ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIII. No. 3425. JULY 16, 1943 6d. WEEKLY

Gaseous Fuel

Possibilities of Power Station Use

IN his presidential remarks at the I.M.E.A. annual meeting recently, Mr. F. Newey placed the onus on gas engineers of devising means of co-operation between the two public services. He invited them to look into the possibility of supplying heat units to power stations at the "right price." That is to say, the all-in cost of generation should not be higher than with modern steam plant.

From data given on a later page, it is evident that under existing conditions the task set the gas industry is a formidable one. In the first place, the heat energy of the coal would undergo two conversions instead of one, each having an efficiency of roughly 25 per cent. and the tonnage to be transported and carbonised would consequently be very considerably increased. A substantial proportion of the original heat reappears in the by-products of gas making and the question arises as to whether a market could be found for the greater quantities of these then available at prices that would enable the cost of gas in bulk to be lowered.

Net Coal Cost

Although the relative proportions of gas and coke can be varied over a wide range, this would not be of much help since the revenue derived from the sale of by-products is now deducted from the original price of the coal to give the "net cost of coal" to be debited to gas making. This may be less than one-third of the actual cost but, even so, the net coal figure exceeds the rate per therm that would probably be acceptable to electricity supply undertakings, in addition to which there are capital, maintenance and operation charges of still greater amount.

Gasworks are laid out primarily for the manufacture of a refined product of high calorific value and freed, so far as is possible, from noxious qualities. The standard attained by means of high-temperature carbonisation would be unnecessary for the purpose under discussion.

Low-Grade Supplies

Presumably, the use of gas would become more attractive when supplies of low-grade coal, which has hitherto found its main outlet in generating electricity, were no longer sufficient—an eventuality that may not be far off. In any event, considerable extensions to gas plant would be needed and a different technique might well be adopted. Perhaps low-temperature distillation, which provides semi-coke and gas, both consumable under boilers, and (if designed accordingly) a larger proportion of tar derivatives. Valuable pioneer work was carried out at one station some years ago, but commercial results then apparently did not justify an extension of the system.

Research leading to gas-turbine development was also indicated by Mr. Newey as desirable. Although notable progress has been made in recent years, gas turbines seem likely to lag appreciably behind steam turbines with regard to unit output capacity as well as thermal efficiency until the metallurgist can produce steel that is

capable of withstanding the very high temperatures requisite. Although the prospects for gas as an alternative fuel in generating stations may not seem bright with existing methods, the advantages attached to a comparatively clean and flexible fuel of unvarying characteristics, free from the expense and trouble of coal and ash handling, are so pronounced that any promise of favourable economic results which further investigations may indicate as feasible would be welcomed by power station engineers.

London Termini

THE L.C.C. proposals for the improvement of London refer to the electrification of all trains entering the London area as a future probability. This step should surely be among the earliest to be taken, not only for the sake of a cleaner atmosphere, but also for coping with any greatly increased volume of traffic. The suggestion that stations for main-line trains should be at ground level misses the opportunity afforded by electrification of putting them underground. The value of the surface area thus released, as the late Sir Philip Dawson pointed out in this journal, would go a good way towards paying the cost of conversion from steam propulsion.

Rural Development

SPEAKING at the summer school of the National Council of Labour Colleges last week Mr. W. Stevens, assistant general secretary of the E.T.U., said (according to the *Daily Herald*) that until the electrical industry became a public (i.e., publicly owned) service rural areas would continue to be neglected. An electrical man should not have made such an unqualified and unfair statement. Mr. Stevens must know, and should have said, that a great deal of work has been done in rural areas and the larger part of it not by publicly-owned authorities, although they too have made a good showing in many parts of the country.

"Q.C."

BY the warning it gives as soon as articles in course of manufacture "go out of limits," quality control, as has been shown previously in these columns, prevents the production of possibly large numbers of defective parts, which would otherwise not be known of until they came to be rejected on inspection of the finished products. With a view to extending "Q.C." to all factories in which it could be advantageously employed (*i.e.*, the vast majority), the Ministry of Production is training demonstrators who will assist manufacturers introducing this quite simple method of securing a high level of output. It has been found also that the posting of Q.C. charts near machines stimulates the interest of operators in their work and promotes a wholesome competition among them.

Post-War Export Trade

AT Ruston & Hornsby's meeting last week the chairman (Mr. G. R. Sharpley) referred to a number of circumstances which would affect British export trade after the war. As others have done, he mentioned the heavy depreciation of plant which would have to be faced and the problem of many small manufacturers who, without some sort of co-operation, would all be producing the same things. He suggested closer co-operation or grouping to prevent this and, together with combined export organisations, enable plant to be produced at competitive prices. Mr. Sharpley considered that one form of assistance which the Government should consider was the amendment of the basis for arriving at "standard profit."

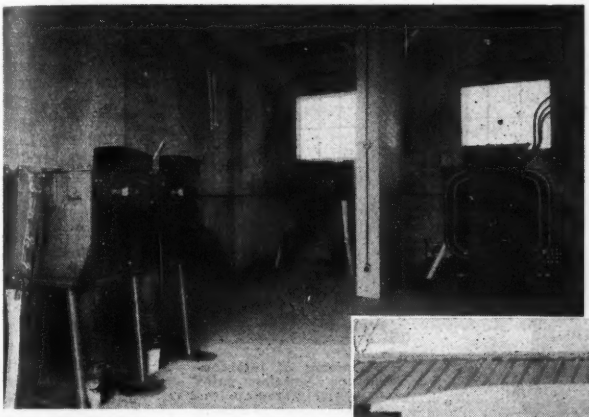
Knowledge and Power

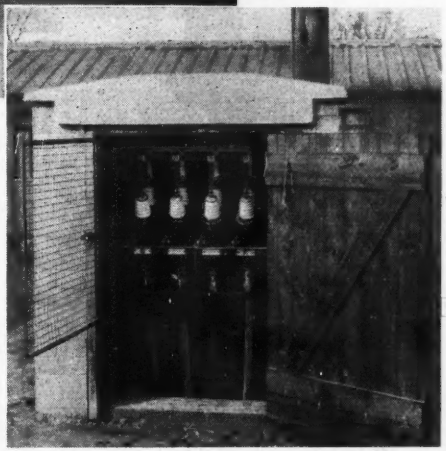
COMPLAINTS have been made in the United States that the Office of War Utilities (which controls power supply) is in the hands of power trust men who are prejudiced against Government-sponsored power projects. A similar kind of objection is occasionally heard in this country and it reveals a very difficult problem. If any industry or commodity is to be controlled, only men with the requisite knowledge and experience (which usually implies men from the industry concerned) can do the job. Can such men be expected to deal impartially with former competitors or are they likely to favour their own interests at the others' expense; and should these others be compelled to lay bare their affairs before a representative of their rivals? There appears to be no answer to these questions but to choose men of the highest integrity, as is the rule here.

All-Electric Estate

Self-contained Scheme Embracing High- and Low-voltage Distribution and House Equipment

ON recently visiting one of the estates which have been established throughout the country to accommodate workers and their families who have moved into districts near the estates to meet the present industrial demands we were impressed by the all-round service afforded by the electricity supply: the homes are essentially all-electric. In no other way could the domestic requirements have been met so quickly, economically and adequately and the consumers are obviously satisfied with their electric homes. Moreover, the consumption and revenue are such that the proposition is a satisfactory one for the electricity supply authority.





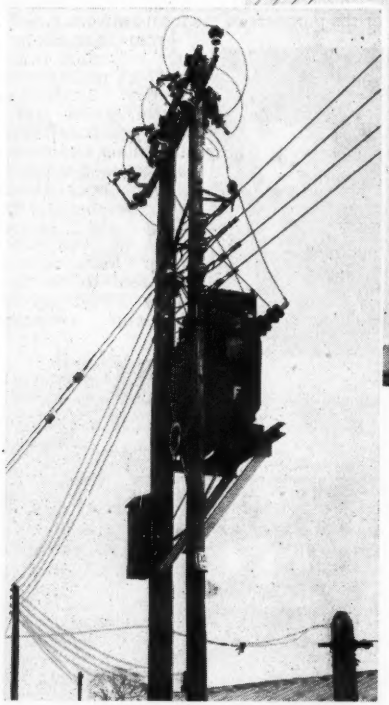
Above: The existing substation for a nearby residential district is the source of supply for the all-electric homes. Primary distribution is through brick-built kiosks (right) with solid busbar systems.

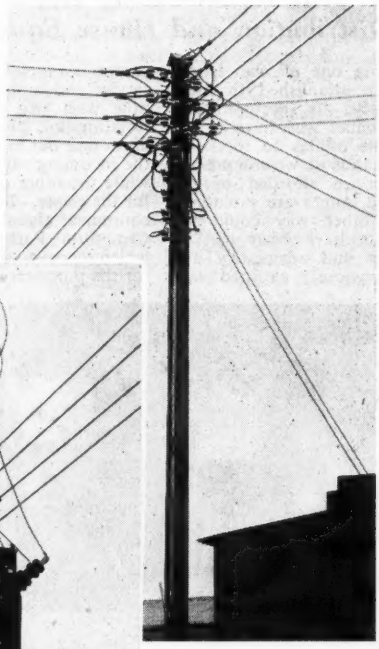
The estate consists of 130 semi-detached bungalows built about a central road 1,000 yd. or so long, the buildings being served by crescent lanes and culs-de-sac branching from the main road. It is near a normal residential district, the existing electricity-supply substation for which serves as the source of supply for the all-electric homes; thus the scheme is an excellent example of how a more or less temporary supply scheme can be dovetailed into a general distribution system. The substation is a typical brick-built modern general-service residential-area installation equipped now with two simple 11-kV oil-immersed isolating-link distributor units connected as an in and out loop. One of these deals with the incoming supply from another substation while the other one is the actual supply unit for the estate. From the busbars of this dual equipment there is a cable connection to a Crompton Parkinson "TAP" switchfuse which serves a 200-kVA transformer installed for the purposes of the local network supply.

From the residential-area substation is fed an 11-kV underground primary distribution system which serves seven pole-transformer substations throughout the estate by means of three brick kiosks which have been spaced along the central road at convenient major load centres. The feed to the first is by 3/0·075 sq. in. three-core armoured cable which is laid slabbed, while the loops from the first to the second and from the second to the third kiosks are unarmoured

cables of similar size and are similarly laid.

Each kiosk measures internally about 5 ft. high, 4 ft. wide and 3 ft. deep, and has 14-inch brick walls and a reinforced-concrete roof. It has a heavy timber door which opens on to a hinged mesh metal screen for protection against contact with the "live" contents of the kiosk. The kiosk distribution equipment comprises a solid 11-kV busbar system built up from the cable trifurcating boxes which are carried on angle-iron cross-bars. A low-voltage service into each chamber supplies a lamp which provides sufficient heat to overcome condensation troubles.





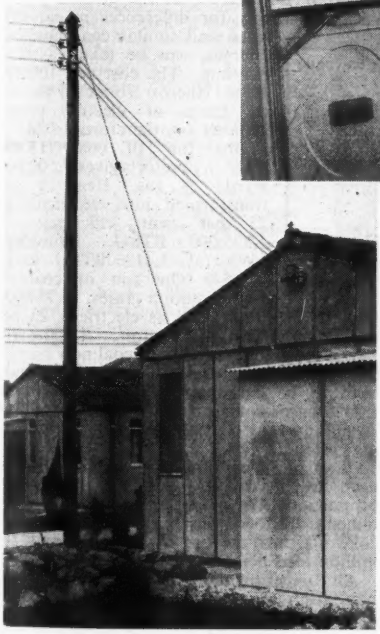
By means of interconnection junction poles (above) at strategic points a high degree of supply flexibility is obtained. Each pole-transformer substation (left) is situated at a convenient load centre of the estate

Solidly connected to the kiosk busbars there are two outgoing feeders to pole-transformer stations from each of the first and second kiosks and three feeders from the third kiosk. These feeders are all 3/0·0225-sq. in. unarmoured cables laid slabbed throughout, with the exception of two road crossings which employ 3-in. ducts for single cables and 4-in. ducts for two cables.

Each pole-transformer substation is arranged at a convenient load centre of the estate, compatible with practical considerations of cable-laying, etc., and is of "H" construction with cross bracing. The cable from the kiosk is taken right to the top of the structure, which is 30 ft. high, where both the outdoor-type trifurcating pole box and Johnson & Phillips D-type fuse links are carried on channel-iron cross arms. From suitably placed supporting pin-type insulators there are direct connections to the transformer which is mounted on a platform fixed on channel-iron brackets about a third of the way down the structure. Each pole substation is equipped with a low-voltage thermal-type m.d. indicator on each phase, the indicators being housed in a wood cabinet mounted on one member of the structure, and to facilitate the connection for the indicator the transformer is specially fitted with the necessary current transformer inside its tank. The transformer is a Lindley Thompson 100-kVA oil-cooled equipment fitted with tap-changing gear for voltage adjustment. From the low-voltage side of the transformer the connections are *via* English Electric h.r.c. cartridge fuses to the low-voltage feeders.

The low-voltage distribution throughout the estate is three-phase, four-wire, to permit easy single-phase utilisation and, with the exception of the pole-transformer terminal points, the lines are carried on single poles with bracket-type insulator line supports. The sizes of the stranded h.d. copper conductors of the main, branch and tail lines are 0·1

sq. in., 0·05 sq. in. and 0·025 sq. in., respectively. Each transformer normally serves its own particular section of the estate, but by means of interconnecting junction poles at strategic points on the system a high degree of supply flexibility is obtained. On each junction there is a Henley four-way tier-formation sliding-contact switch which is remotely rod operated from near the bottom of the pole by a suitable hand and link motion. This switch is normally in the open position, thereby maintaining open circuit between two lines or line groups to which it is connected and which serve from or to neighbouring pole-transformer stations and/or other junction stations. Two or more lines at each interconnecting point may be connected solid, but the scheme is so arranged that by judicious operation of the interconnection switches any section may be fed from any single or group of pole substations.



Each building or pair of dwellings is serviced by two phases and a neutral which may be taken from a terminal pole, an intermediate line pole or even an interconnecting point, the service lines being anchored at bracket insulators on the gable end of the building. One phase and the neutral, however, are extended right through the roof of the building, so that for each dwelling there is a single-phase supply (one phase and neutral) to the service cut-out.

The buildings are pre-fabricated and consist of asbestos-cement exterior walls upheld by reinforced concrete supports. The inner walls consist of hard board and the cavity between the two walls is packed with sawdust

The equipment is completely fitted in; above, a typical kitchen. Each pair of dwellings is serviced by two phases and a neutral which may be taken from an end pole, etc. (left)

for heat-insulating purposes. Each dwelling comprises six rooms, including three bedrooms, a living-room, a kitchen and a bathroom. They are specially designed for all-electric service, no chimneys being included in the structures. The kitchen is equipped with a Creda cooker (four to six persons), a ten-gallon Creda wash boiler, a three-pint Bulpitt kettle and a 25-gallon domestic hot-water tank fitted with a Santon 2-kW immersion heater. For general heating two portable fires are provided—one 1 kW and one 2 kW—and for the use of these there are four plug and socket points in the living-rooms and bedrooms. There are also eight lighting points and one 2-A plug and socket for a radio set in each home.

The total connected load of each dwelling is 14 kW, and for the complete estate, 1,820 kW. Electricity is supplied on a standard two-part tariff consisting of 6s. 6d. per quarter, which is collected with the house rent at 6d. per week, and a unit charge of ¾d.

per kWh consumed, which is collected by means of prepayment meters. The consumption and revenue from the consumers vary very considerably, presumably mainly on account of the varying numbers of the members of the families engaged on industrial work on the shift system.

The estate has not yet been tenanted long enough for a complete year's figures to be available, but there is already sufficient evidence to show that the all-electric scheme is working successfully, with satisfaction both to the consumers and the supply undertaking. Based on the working to date, the following are estimated annual figures. For the complete estate a consumption of 821,000 kWh results in a revenue of £2,734, an average of £21 per consumer.

Gas for Power Stations

Costs and Thermal Values

THE following figures in so far as they relate to the production of town's gas are derived from the recent presidential address to the Institution of Gas Engineers delivered by Mr. E. V. Evans, director and general manager, South Metropolitan Gas Co., Ltd. (see *Electrical Review*, June 15th).

One ton of coal with a heat content of 30,000,000 BThU will provide, in addition to gas, the secondary products shown in the following table, but the proportions of gas and coke can be varied over a wide range.

Product	Million BThU	Per cent. of coal	Price	Revenue from by-products
Gas (75 therms)	75	25	—	—
Coke (10 cwt.)	140	46·6	24s. per ton	12s.
Tar (11 gal.) ..	20	6·7	2½d. per gal.	2s. 3d.
Benzole (3 gal.)	5	1·7	1s. 1d. per gal.	3s. 3d.
Sulphur (10 lb.)	—	—	—	—
Ammonia (7 lb.)	—	—	—	—
				17s. 6d.
Gross cost of coal per ton				25s. 0d.
Net cost of coal, debited to gas manufacture ..				7s. 6d.

For a typical case in which 100 therms are sold per consumer in a town of 200,000 inhabitants, the following values in pence per therm (100,000 BThU) are given:— Net cost of coal, 1·23; wages, 0·40; salaries, 0·15; purification, 0·10; total net cost of gas, 1·88. The cost of pumping gas adds 0·33d. It is stated that the majority of undertakings before the war produced gas into holders at from 2d. to 2½d. a therm, exclusive of overhead charges. For gasworks plant interest is taken at 5 per cent., sinking fund at 3 per cent. and maintenance at 5 per cent., making 1·78d. per therm.

Although not connected with the present subject, figures of distribution costs are of general interest. These are made up of consumer service (at 20s. each), 2·18; management (at 12s. per consumer), 1·31; interest and sinking fund, 5 and 3 per cent. and maintenance at 2 per cent., 2·92. The total cost is therefore 10·4d. per therm. In a final stage of development (424 therms per consumer) the total cost per therm comes down to 6·16d. The net cost of gas and of pumping remains as before. Interest, sinking fund and maintenance become 1·98d. for gasworks plant and 1·14d. for mains, while consumer service and management are reduced to 0·52d. and 0·31d.

The following deductions have been drawn from the foregoing. The price of coal of 11,500 BThU per lb. at the electric power station, allowing for differences in calorific value and similar coal-handling charges, can be taken as 22s. per ton. The cost per 100,000 BThU (therm) from coal burned on grates at electric power stations is, therefore, 1·02d.

One ton of coal (13,400 BThU), in retorts gives 7,500,000 BThU as gas. Heat in gas transformed into electricity at 25 per cent. efficiency = 1,875,000 BThU. Equivalent kWh (at 3,412 BThU each) = 549. One ton of coal on power station grates, 25,750,000 BThU. Heat available as electricity 25 per cent., 6,437,500 BThU per ton = 1,800 kWh.

Therefore for every ton of coal now burned at electric power stations 3·42 tons would have to be carbonised at gas works, and 1·71 tons of coke would be made. In 1941 20 million tons of coal was used for generating electricity, so that a market for an additional 34 million tons of coke would have to be found, assuming the present proportions of by-products to be maintained. The pre-war annual production of coke (Evans) was between 9 and 10 million tons per annum.

An experimental low-temperature carbonisation plant, consisting of two retorts having a 24-hour capacity of 30 tons and one of 60 tons and designed to be operated in association with a generating station, was described in a paper presented by Messrs. E. N. Smythe and E. J. Weeks before the

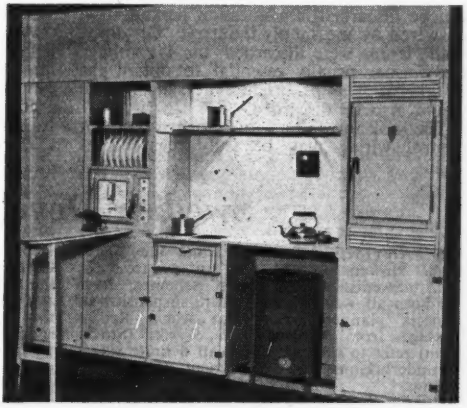
I.E.E. in 1929 (*I.E.E. Journal, Vol.* 68). This was at the Dunston "A" station of the North-Eastern Electric Supply Co. Northumberland small coal (11,600 BThU per lb.) costing 11s. per ton was used. Approximately 76 per cent. of the heat value of the coal was returned in the form of semi-coke (15 cwt.) with a volatile content of 14 per cent. and gas of 80 BThU per cubic foot, which were credited for electricity generation at their heat value only. The residuals, which included 16 gal. of tar and motor spirit, etc., fetched 8s. 11d. per ton treated and yielded a surplus over fuel cost of 57 per cent. to pay for pre-treatment. As the plant had been built up over a number of years by a process of trial and error, no details of capital cost were available. The plant is not now in operation.

The authors stated that "high-temperature carbonisation is not remunerative unless a price is obtained for the gas in excess of that which a power station could afford to pay for gaseous fuel."

The largest gas turbine in commercial operation for generating electricity is the 4,500-kW unit at Neufchâtel, Switzerland. Its thermal efficiency is said to be under 19 per cent. Designs have been worked out for units of 10,000 kW. it is understood, which would have a thermal efficiency of 26 per cent. at a gas temperature of 1,100 deg. F. or, more practicable at present, 24 per cent. at 930 deg.

Unit Kitchen Equipment

As a contribution to post-war planning Mr. R. Illingworth, borough electrical engineer and general manager of Poplar, has just completed a full-sized model of what he describes as an electric kitchen "Compactom." Designed on the unit system, the finished article would be made up in various sizes to suit any type of kitchen and would be especially suitable for incorporation in new housing schemes. As will be seen from our picture, the model, which measures 10 ft. long, by 8 ft. high by 1 ft. 8 in. deep, comprises (from left to right) a broom cupboard large enough to hold a vacuum cleaner; an oven with saucepan and plate racks above and a cupboard for pans, etc., below; hotplate and grill-boiler mounted on a cupboard at the same level as a work table (removable) with space underneath for accommodating a wash-boiler; and a refrigerator over yet another cupboard. An iron or kettle can be plugged into the main control unit, a removable ironing board being provided.



Full-scale model of a unit kitchen equipment designed by Mr. R. Illingworth, Poplar

A ventilating duct along the top of the unit removes any vapour and steam from the cooker, hotplate and wash-boiler, while lighting for the work table is provided from an inset panel above. As practically the whole of the apparatus used in the model has been salvaged from bombed premises and reconditioned, the cooker shown is not of the type intended to be used in the finished unit, which would have a drop-down door, and the refrigerator is slightly larger than the type planned, which would be a 1½-cu. ft. absorption unit.

Installation would be extremely simple since all the appliances plug in and the only connection to be made to the main supply would be the plugging in of the whole unit. The unit system arrangement also, of course, facilitates maintenance and repair since all the electrical apparatus, cooker, refrigerator, hotplates, etc., can be readily unplugged and removed from the unit. It is proposed that a plastic material should be used for the framework, doors, table, etc.

With mass production and the elimination by insetting of all the usual cabinet work required in the standard appliances, Mr. Illingworth anticipates that it would be possible to produce the whole unit at a cost no higher than that for the normal cooker and wash-boiler alone, or, in other words, that the economies effected by the design would be sufficient to pay for a small refrigerator. In addition, moreover, the consumer would have a most convenient, labour-saving and easily kept clean piece of furniture which would take up the minimum of floor space. Its unit construction would permit the arrangement to be easily adjusted to meet individual situations. Members of the Poplar Borough Council have been favourably impressed. The unit is to be on view to the public in the Electricity Department's showrooms.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Synchronising Lamps

IN reply to your correspondent " D. N. M.", whose letter appeared in the *Electrical Review* of June 2nd, synchronising lamps (arranged to be bright at synchronism) have been retained in conjunction with the synchroscope for two purposes, *viz.* (1) as a stand-by means of synchronising in the unlikely but possible event of a failure of the synchroscope and (2) as a constant check that the synchroscope is in line connection with the two supplies to be synchronised. This safeguard is especially important when " check " synchronising, for, in such circumstances, the operator expects a " 12 o'clock " reading and might therefore accept the reading even if it were due to a faulty instrument or an absence of supply voltages at a time when the pointer had come to rest there.

Whether or not the reliability of synchroscopes and control wiring is nowadays of such a high standard that the synchronising lamps can be discarded is a question perhaps best answered by the supply industry. Certainly, if the lamps were discarded, the 1/1 voltage transformer usually essential to obtain the feature of " lamps bright " at synchronism would also be discarded.

The risk of failure of synchroscope or control wiring may be truly regarded as extremely small, but since the insurance against any mal-operation resulting therefrom is secured for the extremely small premium represented by the capital value of two signal lamps and a 1/1 voltage transformer, why let the insurance lapse ?

Manchester. W. H. CAMPBELL.

Planning Rural Development

MR. H. WILSON'S suggested fund to be used as grants or loans for extensions of supplies is admirable (page 50, July 9th issue). How best can it be furthered, promptly ? Have the Electricity Commissioners the necessary powers ? If not, can Mr. Wilson undertake to accumulate and co-ordinate the data that will best ensure progress ? If this imposes too much additional work, I offer him assistance.

To put the proposal into action requires details, quantities and full information from those who could use such a fund. Will Mr. Wilson draft a suitable list of questions ?

Also it will be necessary to co-ordinate all details from all willing to have such a levy imposed on themselves if no compulsory powers exist.

Should not these preliminaries be put into train at once ?

Herne Bay, Kent. THEODORE STEVENS.

Swedish Development

WARTIME difficulties, while they have slowed up the rate of progress of Swedish electrification schemes, have not been allowed to cause entire suspension of projects planned before the war. Recent messages from *Reuter's Trade Service* (Stockholm) refer to the completion of definite stages of undertakings for Government and private systems.

Among these is the first part of the Government-owned hydro-electric power station at Torpshammar on the Gimaan river. For the time being only one turbo-generator set has been installed, the capacity being 45,000 kW. The station, however, is built for two sets of this size.

The fifth power station built for the Uddeholm company at the Skogafors waterfall on the Klaraelven river, West Sweden, has been completed. The station, which is the seventh on the Klaraelven, has two Kaplan turbines with a total capacity of 18,000 HP. The first turbine was already in service at the beginning of May. The total cost of the station is about Kr. 7 million. The Uddeholm combine is already planning further extension and construction of power stations. In the first place an enlargement of the already existing Hagfors, Nykroppa, Knon and Nain stations, by which an additional 18,000 HP will be gained is contemplated. The Edsforsen rapids, situated 3 km. upstream from the Skogafors station, will later be the site of a station of about the same capacity as the Skogafors station. At present the Uddeholm combine is developing 120,000 HP from the hydro-electric power stations on the Klaraelven river. The power is for the most part consumed by the works at Hagfors, Munkfors and Skoghall. The whole of the electrical equipment for the Skogafors station was supplied by A.S.E.A.

In spite of the shortage of materials the electrification of the rural districts of Sweden has continued during the war. An inquiry made by Kommerskollegium in 1938 showed that 67 per cent. of the rural districts were then electrified, and in the autumn of 1940 it was estimated that the proportion had risen to 76 per cent. of the districts that could be electrified (the inaccessible districts are estimated to contain only 5 per cent. of the rural population). There are no quite reliable figures for the last two or three years, but it is estimated that at the end of 1942 only about 12 per cent. of the possible districts did not possess systems for the distribution of power to farms and households. Interest in electrification is steadily increasing, and the demand for a State subsidy has been growing.

Electric Lift Practice

Points for Standardisation

By L. W. Honey, Assoc.I.E.E.
(Director of Marryat & Scott)

THE Code of Practice for the installation of passenger and goods lifts issued under the auspices of the Building Industries National Council, whilst providing a useful standard construction specification for use by architects, consulting engineers and manufacturers, does not deal with the standardisation of lifts in general. It does not, for instance, suggest standard running speeds and loads, which would permit standard motor speeds, reduction gear ratios and driving sheave diameters.

Although a large percentage of lifts installed comes within a comparatively small range of speeds and loads, it is at present the practice of most manufacturers to supply lifts for any lifting speeds and loads required by employing various reduction-gear ratios, driving sheave diameters and motor speeds. In addition cars are constructed to suit varying sizes of wells with entrances of varying widths.

When post-war re-building and new building commences in earnest, a considerable number of lifts will be required very quickly for home and export, so that it would be of considerable advantage if they could be delivered complete from stock.

By standardising speeds and loads, standardisation of reduction gears, driving sheaves and motors would follow and these items could then be manufactured in quantities with resulting saving in first cost and increased turnover.

Standardisation should embody the requirements of the Factories Act 1937, the Lift Code of Practice and the British Standard Specifications applicable to lift components.

This article deals with only the most essential items. The final solution is in the hands of the industry itself, probably through a committee appointed by the National Association of Lift Manufacturers, working in conjunction with the Building Industries National Council and the Institutions of Electrical and Mechanical Engineers.

Lifting Speeds

The importance of standard lifting speeds is that they mainly decide the speeds of motors, reduction-gear ratios and diameters of driving sheaves. The following range in ft. per min. is proposed as sufficient to meet all requirements: 65, 130, 200, 350, 500 and 700.

The second of these speeds (130 ft. per min.) is usually accepted as being the highest convenient speed for car switch or automatic push-button controlled lifts with single-speed motors, if the car under all conditions of load is to stop within normal floor accuracies. The first speed, 65 ft. per min., is usually found ample for a large proportion of goods lifts for which the time of loading generally far exceeds that of travel. Goods lifts could run at any of the higher speeds if conditions warranted this.

These two speeds would permit a unit range of x lb. at 130 ft. per min. with single-wrap roping or 2 x lb. at 65 ft. per min. with two-to-one multiple roping with the same reduction gears, driving sheaves and motors.

The third speed, 200 ft. per min., is determined by being the maximum speed recommended by the Lift Code of Practice where car safety gears of the instantaneous-action type are employed. For speeds above this, safety gears of the wedge type are recommended, which cost approximately £60 to £80 more and give no extra *service* in any way.

A speed of 350 ft. per min. is generally accepted as the highest speed for geared construction to ensure smooth running. Gearless machines in this country can seldom be usefully employed at speeds in excess of 500 ft. per min. for inter-floor service in view of the time taken to accelerate and decelerate. For installations where the distance between stopping points is 30 ft. or more it would be practical to employ gearless machines up to 700 ft. per min.

At the last two speeds for gearless machines the use of single roping is assumed, but by employing two-to-one multiple roping a lifting speed of 350 ft. per min. could be obtained with the winding machines employed for 700 ft. per min.

Loads

Standard ranges of loads applicable to both passenger and goods and service lifts would be most helpful and the figures in Table I are suggested.

TABLE I

RANGE	LOAD IN LB.	EQUIVALENT LOAD IN PASSENGERS (1 person equals 150 lb.)
1	150	Service lift
2	750	5
3	1500	10
4	2250	15
5	3000	20
6	3750	25
7	4500	30

It is intended that standardisation should apply only to counterbalanced lifts with traction drive. The first range amply covers

the greater proportion of small service lifts. Between it and the second range there is so little call, except probably for lifts for three or four passengers, that an intermediate range would not seem warranted.

No standard overload test has yet been determined by the lift industry itself. A definite ruling is needed and 10 per cent. over the net load to be raised is suggested, which would equal, on lifts counterbalanced by 50 per cent., a 20 per cent. overload on the reduction gear, controller and motor.

Cars, Wells, Motor Rooms & Entrances

As many goods lifts are constructed to carry a definite size of load such as motor cars and trucks, it is difficult for such installations to provide a basis for standard sizes of lift cars and wells. Where, however, lifts carry small packages, or, more particularly, passengers only, there is no reason why standard ranges of cars and corresponding lift wells should not be introduced and clear useful data provided for use by architects in the design of new buildings. The sizes of cars applicable to the standard loads suggested should be given and the corresponding lift wells should be of such a size that they can be easily constructed with standard bricks.

The standard sizes of passenger-lift cars and wells proposed for use in conjunction with the standard loads are given in Table II. The table would also be applicable to goods lifts where the size of goods carried does not require a car of special dimensions. It is assumed that there is only one entrance.

It is proposed that the counterweight shall always be arranged at the side of the lift well, which will permit of single or multiple roping and provide bunching space when two or three speed sliding doors are used to protect car and landing entrances.

The sizes will permit the construction of lift wells with standard 9 by 4½-in. bricks, but if concrete or other constructions are proposed it is recommended that the same well sizes should be employed so that standard guide-rail fixing brackets can be made.

TABLE II

Load in lb.	Load in Persons	Size of Car Outside		Size of Lift Well	
		Width	Depth	Width	Depth
		ft. in.	ft. in.	ft. in.	ft. in.
150	—	2 1	2 1	3 0	2 3
750*	5	4 0	3 0	5 7½	4 1½
1500	10	5 0	4 0	6 9	4 10½
2250	15	6 0	4 6	7 10½	5 3
3000	20	7 0	5 0	9 0	5 7½
4500	30	8 0	6 0	10 1½	6 9

* A larger well in proportion to car size is required for this load to allow suitable space for shaft equipment.

Incorporated with the details given for the construction of lift wells there should be a standard method for the easy attachment of the lift guide rails. Although most lift manufacturers will probably agree that the tee guide rail is by far the most suitable for standardised construction, it is not the intention of this article to deal with the merits or otherwise of component designs; but whether guide rail of tee or round section be employed, the design of the standard guide attachment should be suitable for either type. Instructions and information should embody standard dimensions for landing entrances.

With the lessons learnt during the present war regarding the effects of fire and experience gained in the United States of the value of the lift as a life-saving device in case of fire, the whole construction of lifts, their enclosures and entrances should be of fire-proof material.

Lift manufacturers would probably prefer all motor rooms to be immediately above the lift well. There are sometimes difficulties in the way of this, but it is the ideal position to permit of the maximum standardisation, particularly of rope sheaves and pulleys.

It is not practicable to insist on this arrangement in all cases, especially where the site line of the building does not permit of a roof dormer to accommodate the overhead machinery and in hospitals and office and residential buildings where the requirements of silence or maintenance make it desirable to place motor rooms in the basement.

The placing of motor rooms immediately above or below the lift wells would permit of a standard construction of reduction gear, bed plate, outer bearing and pedestal and also ensure the best rope drive.

B.S. Specifications

The standardisation of electric lifts should incorporate any applicable requirements of the following B.S. Specifications.

No. 329—1939 .. Round strand steel wire ropes for lifts and hoists.
No. 462—1932 .. Bull dog grips.
No. 464—1932 .. Thimbles for wire ropes.
No. 621—1935 .. Wire ropes for special construction for engineering purposes inclusive of cranes, lifts and excavators.
No. 721—1937 .. Machine cut worm gears.
No. 896—1940 .. Dimensions of stretchers, stretcher carriers and ambulances and hospital trolleys.
No. 977—1941 .. Flexible cables for electric lifts.
No. 168—1936 .. Industrial electric motors and generators.
No. 587—1939 .. Motor starters and controllers.

British Standard Glossary of Terms used in Electrical Engineering: Section 10—sub-section 101—Electric Lifts.

Boiler Cleaning

Treatment of Internal and External Heating Surfaces

By Vernon Walker, A.M.I.E.E.

IN the maintenance of clean internal heating surfaces in boilers, the main factor is correct feed-water treatment, which can now generally be controlled to such an extent that practically no scale-forming material is produced on the inside of the evaporating surface. Chemical treatment for preventing scale formation will often, however, produce considerable sludge and the difficulty of obtaining a proper compromise between scale and sludge may result in a need for internal cleaning.

The long bent tubes employed in some modern boilers increase the difficulty of internal cleaning, while the minimising of the number of joints tends to make the internal surfaces inaccessible to the tube cleaners. For these reasons the chemical cleaning of boilers is being developed. In the United States one leading manufacturing company, which has built a number of high-pressure units the surface of which is composed of relatively small tubes that are inaccessible for mechanical cleaning, has concluded—as a result of observation during the last five years—that chemical cleaning is entirely satisfactory.

Chemical Methods

Either hydrochloric or lactic acid is used, together with an inhibitor to prevent corrosion of the steel parts. In all cases the acid mixture is heated to the proper temperature, and an analysis of the discharge from the unit is taken as a guide to determine when the foreign material is eliminated. A thorough washing with warm water follows the acid, the last traces of which are eliminated by a final alkali wash.

Chemical cleaning has been adopted by several supply undertakings in the United States, particularly for boilers for 1,200 lb. per sq. in. and higher. In some instances individual sections, such as an entire side wall or an entire generating bank, have been cleaned as a unit, in order to minimise the amount of acid required and to permit varying the time between applications in proportion to the amount of scale or sludge to be removed. In other instances the entire boiler unit has been cleaned, the boiler drum being used as a surge tank and the chemical solution being pumped through all the circuits simultaneously.

In one station acid cleaning of high-pressure boilers was initially based upon satisfactory experience with condensers, closed feed heaters and low-pressure boilers. Previous turbining of some tubes of a high-pressure boiler had removed the greater amount of deposit, but there remained a layer of hard and very tenacious scale of less than eggshell thickness.

This scale was effectively softened and removed by acid cleaning. Sludge and scale removal to the bare metal has proved so successful with acid that subsequent turbining is now considered unnecessary. In this case each section of the primary and secondary furnace-wall tubes and headers is cleaned separately.

Deposit in Economisers

Inhibited acid has been used to clean deposit from return-bend economisers, each vertical bank of tubes being cleaned individually. The top and bottom return U's were removed and a connection was made to a small pump with its suction fed by a 55-gal. drum. A connection from the top tube bank returned to the drum. Fresh water was first circulated through the tubes which discharged to waste, thus removing a considerable amount of sludge. The tubes were then blown clean by compressed air.

The drum was filled with a 5 per cent. solution of inhibited acid which was circulated in a closed circuit through the tubes for twenty minutes. Fresh water was then admitted to the pump suction and the drum drain opened. Tests of the return to the drum were made with Mertyl red indicator to determine when all acid had been flushed from the tube bank. The tubes were again blown clear by compressed air and a solution of 5 lb. of soda ash to 55 gal. of water was circulated through the tubes. The soda-ash solution was flushed out with fresh water and the bank finally blown clear with compressed air.

In many installations only short sections of the tube ends are visible and various devices such as a periscopic lamp and mirror, a mirror mounted on a carriage which can be passed through a hand hole and internal diameter gauges have been used for surface inspections.

Soot Blowers

As regards external surfaces, the various sections of boilers must be arranged for cleaning while in operation. Retractable soot blowers have in many cases replaced the revolving type, especially in high temperature zones. Steam pressure to the soot blowers of the boiler and superheater has been increased to as high as 600 lb. per sq. in.

Hand lancing with water has been successfully used for both boiler and superheater tubes with either a single jet or else an extensible lance with a number of jets spaced in relation to the tube. A register limits the traverse travel and the arc of rotation of the lance. The sudden chilling of the slag by water at 80 to 100 lb. per sq. in. causes the slag to contract and split. A second application of the water may be necessary to cause the slag to fall away. As far as possible the jet should not be allowed to spray on the tubes after the slag has been detached, as the consequent reduction in temperature of metal, followed by a rapid rise on removal of the jet, may cause strain. The jet should not strike the headers or leakage of expanded joints may result. The advisability of water lancing high-temperature alloy superheater tubes and hangers and long straight boiler and superheater tubes is questioned by some authorities.

Slag Removal by Temperature Change

Reducing the boiler rating or banking, thus cooling the furnace walls, sometimes results in the removal of practically all slag accumulation. An increase in surface temperature has also resulted in an improvement in slagging of the superheater, owing to the increase in heat absorption in the furnace and a resultant lower temperature at the remaining heat transfer surfaces. Wider spacing of front-bank tubes of the superheater has also markedly reduced bridging over by slag.

Economisers are frequently washed with water or soda-ash solution, preferably when the boiler has just been taken out of service and the tubes are warm. Recirculation of the feed water during starting up or light load prevents deposits on the tubes at these times and is becoming more common practice. In general there is less trouble with slag or soot deposit on economiser sections and the tubes can normally be kept clean by steam soot blowers. The corrosion of the external surface of economiser tubes may be a factor if water washing is employed.

Periodic intensive cleaning of air heaters generally consists in the removal and wire brushing of the plates, drilling with tube cleaners, soaking with water or a solution of soda and subsequent flushing or washing of the plate in an acid bath.

If heating surfaces are maintained above dew point any deposit will be dry and easily removable. The average of the temperatures of the air entering and gas leaving the heater provide an accurate measure of the temperature of the metal at the cold end. By-passing and recirculation of the air is commonly employed to maintain the metal above dew point, by-passing being particularly effective at starting up when all the air can be passed round the air heater without reduction in gas temperature. For cleaning during operation soot blowers are still standard at pressures of from 150 to 200 lb. per sq. in., superheated steam being preferred.

When cleaning regenerative air heaters it has often been found more effective to use only the soot blower operating from the hot end in the direction of the flow of the gases. The use of the elements at the cold end has actually been found to add to clogging and hence corrosion due to moisture in the steam, which when blown from the hot end is vaporised. Vertical or horizontal regenerative heaters are washed after taking the unit off load (unless provision is made to by-pass both the gas and air entering the housing) by hand-lancing the plate with water up to 200 lb. per sq. in., the rotor being turned by hand.

The vertical regenerative heater has a gravity flow to carry away deposits and can be provided with a water nozzle over the air outlet similar to that of a soot blower. As washing is possible without entering the housing while the rotor is being slowly turned, it can be done while the boiler is on load if there are two heaters per boiler, one being blanked off and the other operated at from 50 to 75 per cent. of peak capacity. Washing is effective only if plenty of water is used. A water temperature between 175 and 200 deg. F. has been found most effective in removing deposits quickly.

There is a greater tendency towards fouling when using coals having a high sulphur content and most of the corrosion then experienced has occurred during shut-down periods. This has been eliminated by either blowing or washing the surfaces clean immediately on taking the unit off load.

In general the problem of slag accumulation is still unsolved. Changes in operating procedure, improvement in cleaning equipment (such as automatic soot blowers), and the provision for adequate access to boiler surfaces have, however, largely removed the frequency of boiler outage for removal of deposits on external surfaces.

Business Reply Services

THE Postmaster-General states that the decision to withdraw the business reply service was taken after very careful consideration had been given to the probable effects of its withdrawal on electricity, gas and other public utility undertakings. While appreciating the usefulness of the service to electricity undertakings, the Postmaster-General regrets that it is impossible to make a further concession, but suggests that the use of cards having stamps printed on them offers a reasonable alternative to business reply cards for meter reading purposes. The British Electrical Development Association is sending its members copies of G.P.O. Circular L.B. 633, which describes the facilities that remain available.

The Schräge Motor

An Explanation of its Working

By O. E. Mainer,
B.Sc.Tech., A.M.I.E.E.

BRIEFLY the Schräge motor is a polyphase rotor-fed induction motor with an additional commutator winding for speed control and power-factor correction. In this article it will be assumed that the motor is three-phase and wound for two poles.

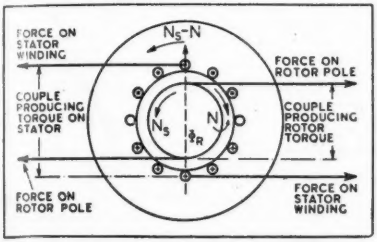


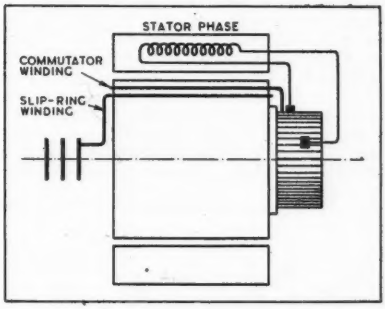
Fig. 1.—Speeds and torques set up (Φ_R, rotor field)

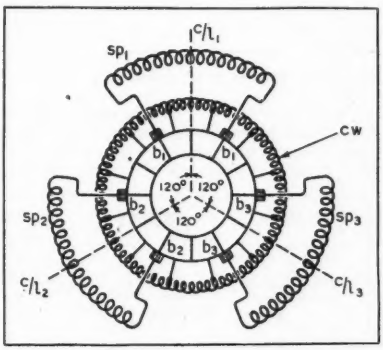
The three-phase supply is fed into the slip-rings of the rotor winding and sets up a nearly constant field rotating at synchronous speed, N_s RPM, relative to the rotor. If the rotor is locked this field will cut across the stator winding and induce in it EMF's and currents. The interaction of the stator currents and rotor rotating field will produce a torque tending to rotate the rotor in the reverse direction. The stator cannot move, but if the rotor is freed it will rotate in the opposite direction to the rotating field at N RPM. Fig. 1 shows the speeds and torques set up.

The magnitude of the stator induced EMF is proportional to the rate at which the field (Φ_R) cuts across the stator winding and the field now moves relatively to the stator at $N_s - N$ RPM; it follows that the stator EMF is $E_1 = k(N_s - N)$, where k is a constant.

The EMF in the stator winding of a two-pole machine completes one cycle per revolution of the rotating field. As the field makes $N_s - N$ revolutions in space per minute, the frequency, f_1, of the stator EMF is given by $f_1 = N_s - N/60$ cycles per sec.

The commutator winding is contained at the top of the rotor slots and is quite separate from the slip-ring winding. As it forms part of the rotor it is cut by the rotating field at synchronous speed. It follows that the maximum EMF in any conductor or group of conductors forming part of the commutator winding is constant and independent of the motor speed. Figs. 2 and 3 show diagrammatically the connections between the commutator winding and stator phases. The only way the brush EMF, E_b, can be varied is by altering the number of segments contained between any brush pair. In short, the brush EMF is only dependent on the distance between a brush pair. In order to get the maximum EMF at the terminals of a DC generator the brushes must be arranged to make contact with conductors in the neutral zone as shown diagrammatically in fig. 4. Suppose the pole system to be rotative by means of a hand lever as indicated. Let the poles be rotated relative to the brush centre line to positions 2, 3 and 4 in fig. 5. In position 2 the brushes make contact with conductors at right angles to the neutral zone and the brush





Figs. 2 (above) and 3.—Connections between commutator winding and stator phases
C/l, centre line of brush pair and stator phase; bb, brushes; cw, commutator winding; sp, stator phase

EMF is zero. (This effect can easily be demonstrated by rocking the brushes of a two-pole dynamo at right angles to the neutral zone.) In position 3 the maximum EMF is

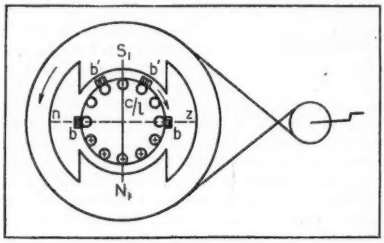


Fig. 4.—Brushes arranged to make contact with conductors in neutral zone
C/l, centre line of brushes; nz, neutral zone; bb and b'b', brush positions

again generated, but the EMF is reversed. In position 4 the EMF is zero again; a further movement through 90 deg. brings the poles back to the first position. Thus the brush EMF goes through an AC cycle during the rotation of the field system. This is shown in fig. 6. If the pair of brushes were placed in the alternative position b'b', a similar EMF would be generated, but its maximum value would be reduced as shown by the dotted line. Similarly an AC EMF

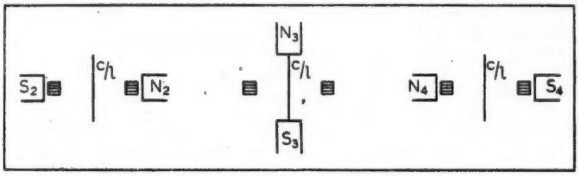


Fig. 5.—Positions of poles relative to brush centre line

is generated at each pair of brushes in fig. 3. The frequency of the brush EMF will be equal to the number of revolutions in space of the field per second, *i.e.*, $f_b = N_s - N/60$ cycles per sec., the same frequency as that in the stator winding. Referring to fig. 3, the brush centre lines are 120 deg. apart. Therefore one-third of a period elapses while the crest of the rotating field passes from the centre line of one brush pair to that of the next brush pair. This gives a three-phase supply at the three pairs of brushes. It is clear then that the brushes can be connected to the three phases of the stator winding as shown. With the brushes in the position shown, E_b and E_1 reach their maximum values at the same instant, *i.e.*, the two EMF'S are in phase. However, they oppose one another in circulating current through the stator winding.

Speed variation is achieved by simultaneously opening or closing the brush pairs on their centre lines as shown in fig. 7. If the brushes of each pair are moved to the same segments (*a*), E_b is zero and the motor runs as an induction motor. If the brushes

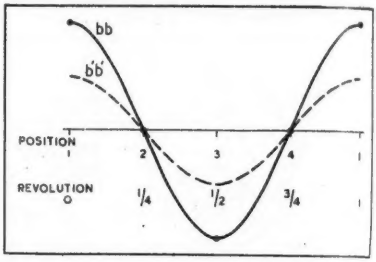


Fig. 6.—AC cycle of brush EMF during the rotating of the field system

are opened out as shown in (*b*), E_b opposes E_1 and the motor speed drops until $E_1 = k(N_s - N)$ is large enough for $E_1 - E_b$ to circulate enough stator current to produce the driving torque.

If the brushes are crossed over to the position shown in (*c*), E_b reverses and helps E_1 and the motor speeds up to just below synchronism, *i.e.*, until E_1 is reduced to a value where $E_1 + E_b$ circulate sufficient current in the stator. If E_b is increased until the speed reaches synchronism, then the rotating field becomes stationary in space and $E_1 = O$, also $f_b = f_1 = O$. In other words the motor is fed with DC from the commutator. A further movement of the brushes to the position (*d*) causes the motor to accelerate above synchronism. The rotating field now reverses in space and runs round in the same

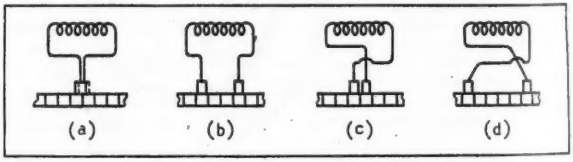


Fig. 7.—Speed variation by opening and closing brush pairs

direction as the motor. As a result E_1 reverses and opposes E_b. The motor will accelerate until $E_1 = k\ (N - N_s)$ attains a value at which $E_b - E_1$ is just large enough to circulate the necessary torque current in the stator. Power factor is corrected by rocking the entire brush system round the commutator. At sub-synchronous speed, as shown in fig. 8, if E_b is retarded, $E_1 - E_b$ will be advanced. This will advance the phase of the stator current and so improve

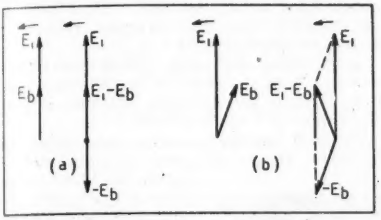


Fig. 8.—Vector diagrams; sub-synchronous speed

the power factor. In order to retard E_b, the brush system must be rocked in the direction of the rotating field, *i.e.*, against the direction of the motor. The rotating field will then cut across the centre line of each brush pair a little later than it cuts across the centre line of the corresponding stator phase. At super-

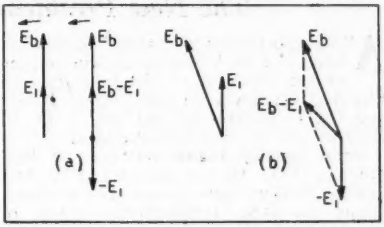


Fig. 9.—Vectors; super-synchronous speed

synchronous speed the corresponding vector diagrams are shown in figs. 9 (a) and 9 (b). At super-synchronous speed the field reverses and travels round in the same direction as the motor at $N - N_s$ RPM. The field now cuts the brush centre line before the stator phase centre line and therefore E_b is in advance of E_1. This causes $E_b - E_1$ to lead on the position shown in fig. 9 (a). In other words a shift of the brush system against the direction of the motor gives improved power factor at all speeds.

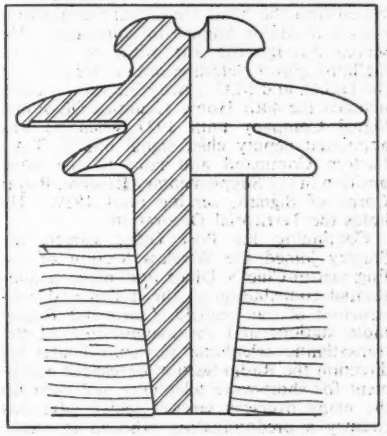
New Line Insulator

WITH a view to avoiding some possibility of wood cross-arms catching fire with consequent risk of shock when light rural pole lines are used with the insulator ironwork unearthed and unbonded, Mr. G. T. Garwood (engineer and resident manager, West Hampshire Electricity Co., Ltd.), has designed an insulator, manufactured by Bullers, Ltd., which is claimed to be unpuncturable and to be comparable in cost with a normal pin-type unit complying with B.S.S. rating No. 50 with metal spindle.

In the new model the spindle is replaced by an axial prolongation of the dielectric body, which is terminated in a conical taper for wedging into a socket in the cross-arm. At the maximum voltage for which the insulator is now made, 11 kV, no charring has been reported in six years' experience of unbonded construction in this country. It has been found that the omission of the earth connection and the interposition of the high impulse insulation afforded by the unearthed wood pole restrains lightning flashover and transient earth faults, eliminating the following power arc and consequent trip out. By omitting the bonding between insulator supports and interposing the secondary insulation of wood between phases certain inter-phase faults are also avoided.

The following test results have been obtained with 18-in. of oak cross-arm in series with the insulator: Dry flashover, 62 kV; wet flashover, 40 kV; impulse flashover, 300 kV; radio interference, dry, 40 kV (RMS); radio interference, salt spray, 20 kV (RMS). Since no metal or cement is associated with the porcelain, the latter is free from thermal stresses.

Like the expensive line-post insulator, the type under discussion utilises porcelain to resist transverse loading moments. Its rated ultimate transverse strength is 2,000 lb. The low electrostatic capacity reduces the likelihood of radio interference from the binding wire. Over 2 lb. of steel is saved per unit and much time is saved in fitting and replacement.



An unpuncturable line insulator

I.E.E. Elections

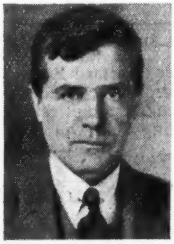
The New President and Vice-Presidents

As we report in our "Personal" section this week, Col. Sir A. Stanley Angwin has been elected President of the Institution of Electrical Engineers for the 1943-44 session and Dr. E. B. Moullin and Mr. T. G. N. Haldane are the new Vice-Presidents.

Sir A. Stanley Angwin was born at Penzance in 1883. He was educated at the East London College (now Queen Mary College), taking the B.Sc. (Engineering) degree of London University, and he served an apprentice ship with Yarrow & Co., Ltd. He joined the Post Office Engineering Department in 1906 and shortly after was transferred to Glasgow.

He was responsible for the formation of the Lowland Division Telegraph Company when the Territorial Force was inaugurated. This consisted almost wholly of Post Office men and when it was "embodied" in 1914 it was converted into the 52nd Divisional Signal Company with Major Angwin in command. He served through the war with the unit in Gallipoli, Egypt, Palestine and France and won the D.S.O. and M.C. After the war he commanded the 44th Home Counties Divisional Signal Company until 1927 when he was appointed deputy chief signal officer, T.A., Eastern Command and later to the same position in the Supplementary Reserve, Royal Corps of Signals, serving until 1939. He holds the Territorial Decoration.

Continuing his Post Office career, Sir Stanley joined the Wireless Section of the Engineer-in-Chief's Office and made a substantial contribution to the design and construction of the Leafield, Cairo and Rugby radio stations and the inauguration of the transatlantic telephone service. Under his direction the Radio Section developed equipment for short-wave telephony and built up the many overseas services which gave this country a predominating position in world telephony.



The President and Vice-Presidents of the I.E.E. for 1943-44: Sir A. Stanley Angwin, Dr. E. B. Moullin and Mr. T. G. N. Haldane

Sir Stanley has taken a large part in international conferences on telecommunications and has been a member of the Government Television Committee since its commencement. He became assistant engineer-in-chief of the Post Office in 1933 and was promoted to deputy in 1935. Since 1929 he has occupied the position of engineer-in-chief; he was knighted in 1941.

He has been very active in Institution affairs and has been chairman of the Wireless Section. He is an associate member of the Institution of Civil Engineers.

Dr. E. B. Moullin is a Dorsetshire man born in 1893. He was educated at Cambridge and holds the M.A. degree both of that University and of Oxford. He was a University lecturer at Cambridge from 1920 to 1929. He was appointed Donald Pollock Reader in Engineering Science at Oxford in the latter year and shortly afterwards became a Fellow of Magdalen College.

Dr. Moullin's interest in radio communication began about 1909 and later he did much to further the practice of radio-frequency measurements. In 1922 he invented and patented the original thermionic voltmeter which was manufactured by the Cambridge Instrument Co., Ltd., and in 1926 he published the first work on radio-frequency measurements. Later he developed a standard ammeter for very high frequencies and he has also designed several other instruments for precision radio measurements.

His work at Oxford has included the study of background noise in radio receivers and of the mechanism of energy loss in dielectrics. He has also devoted much time to the theory of radio aerials and has written papers on the subject. Other publications include "Principles of Electro-magnetism" and "Spontaneous Fluctuations of Voltage." Dr. Moullin was chairman of the Wireless Section of the I.E.E. in 1939-40 and is a member of the Radio Research Board.

Mr. T. G. N. Haldane, M.A. (Cantab), has been with Merz & McLellan, consulting engineers, since 1925, being made a partner in 1941, and during his association with the firm he has travelled extensively abroad to study power supply problems. Mr. Haldane, who was born in 1897, was educated at Edinburgh

Academy and the Royal Naval Colleges at Osborne and Dartmouth. He served throughout the last war in the Navy and took part in a number of actions, particularly in connection with landing parties. He was in the Dardanelles during the landing and in the Battle of Jutland. He went to Trinity College, Cambridge, after the war, and in 1922 became a Senior Exhibitioner, also taking the B.A. degree (Natural Science Tripos). On leaving Cambridge in 1923 he obtained an appointment with C. A. Parsons & Co., Ltd., staying with the company until he joined Merz & McLellan. In 1927 he took the M.A. (Cantab.) degree. He was elected to the Council of the I.E.E. in 1928.

In 1932 Mr. Haldane visited the U.S.S.R. to study power supply and other problems. In 1937 he went to Sweden and in 1938 he visited the United States to study the T.V.A. and Boulder Dam schemes and to advise the Federal Government on matters relating to power supply. Mr. Haldane is a member of the Institution of Civil Engineers.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE ballot for officers and council of the Institution of Electrical Engineers for the 1943-44 session has resulted in the election of the following:—*President:* Sir A. Stanley Angwin, D.S.O., M.C. *Vice-Presidents:* Mr. T. G. N. Haldane, M.A., and Dr. E. B. Moullin, M.A. *Hon. Treasurer:* Mr. E. S. Byng. *Ordinary Members of Council:* Brigadier F. T. Chapman, C.B.E., Mr. J. Hacking, Mr. A. L. Lunn and Dr. J. L. Miller (members); Messrs. J. S. Forrest, M.A., and E. C. S. Megaw, M.B.E. (associate members); and Mr. E. Leete (companion).

Mr. T. E. Goldup has been elected chairman of the Wireless Section of the Institution of Electrical Engineers for the session 1943-44, and **Professor W. Jackson,** D.Sc., D.Phil., will be vice-chairman.

Mr. Selwyn S. Grant, O.B.E., has been elected chairman of the Devon and Cornwall Sub-Centre of the I.E.E. for the next session. The vice-chairman is **Mr. F. E. Pitt.** The sub-centre's report for 1942-43 shows that the membership at June 30th was 215, of whom 50 were students and 21 associates. Four meetings were held, the average attendance being 30.

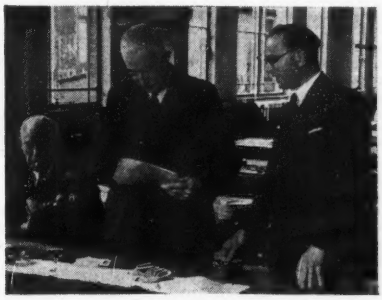
Major Norman F. Gadsdon, M.C., area manager to the Bournemouth & Poole Electricity Supply Co., Ltd., and its associated companies since 1939, has been appointed a director of the Bournemouth & Poole Electricity Supply Co., Ltd. Educated at Eastbourne College and Brentwood, Major Gadsdon has had thirty-four years' experience in the electricity supply industry, having joined the staff of the County of London Electric Supply Co., Ltd., in 1909. At the outbreak of the last war, he went to France with the Territorials, later serving with the Essex Regiment and the Machine Gun Corps. Besides the M.C., he was awarded the Croix de Guerre, and was twice mentioned in despatches. On returning to civil life in February, 1919, he returned to the County of London Co., and later became assistant secretary and held other managerial appointments in the County of London organisation.

Major N. F. Gadsdon

Lord Dudley has been re-elected president of the Federation of Chambers of Commerce of the British Empire and **Sir Arthur Aiton** has been re-elected chairman of the Council.

Mr. K. W. M. Pickthorn, M.P., has joined the board of the Metropolitan Electric Supply Co., Ltd.

A presentation was made recently at the Union Works of the G.E.C., to **Mr. J. A. Phelp,** who recently retired from the managership, after forty years' service with the company. Mr. H. G. Cheel, the present manager, handed him a cheque, together with a memorial parchment and, together with Mr. W. H. Chapman on behalf of the staff, wished him good health and happiness. Mr. F. G. Quance, manager E.L.S. department at Magnet House, on behalf of the selling side of the organisation, presented Mr. Phelp with another cheque and a small album inscribed with a message of goodwill from his many colleagues. Mr. Quance also read a telegram from Dr. A. H. Railing, chairman and joint managing director of the company.



Mr. Phelp receives the presentation subscribed for by the staff of G.E.C. Union Works.

At Edinburgh University on July 2nd the degree of D.Sc. was conferred on **Mr. Henryk Herbich,** a distinguished Polish engineer, whose

services as consultant were enlisted by the French Government when he was evacuated to France from Poland in 1939. In May, 1941, he began his studies in the Engineering Department of Edinburgh University, where he has conducted a comprehensive investigation of water-power schemes with special reference to post-war hydro-electric development in East Central Europe. He was head of the Hydro-Electric Research Centre in the Polish Hydrographic Institute. Mr. Herbich designed and erected seven large power stations in Poland, and is the author of a large number of standard works on hydro-electric and kindred matters.

Mr. T. C. Elliott, London manager of the D.P. Battery Co., Ltd., retires on July 31st after thirty-three years' service with the company. He has always been keenly interested in the development of battery traction, and for many years has been a member of the Electric Vehicle Committee. Before joining the D.P. Battery Co., Ltd., he was occupied with train lighting and as a member of the Institution of Railway Signal Engineers he regularly attended conferences both at home and on the Continent.

At a recent meeting of the management board of the Engineering and Allied Employers' National Federation an engraved silver tray was presented to **Mr. G. E. Bailey,** C.B.E., M.Sc., M.I.E.E., works director of the Metropolitan-Vickers Electrical Co., Ltd., in recognition of his work for the Federation since 1921. After acting as vice-president for a number of years, Mr. Bailey was elected president in May, 1940, succeeding Sir Charles Craven, in which capacity he served until February, 1943. To mark its appreciation of his work the general council has appointed Mr. Bailey a trustee. Mr. Bailey has served on a very large number of Federation committees as well as on several Government committees and panels, including the Beveridge Committee dealing with skilled men in the Services.

Mr. G. E. Bailey

In addition to the silver tray, inscribed with the signature of each member of the management board, Mr. Bailey was asked to accept a silver tea service on behalf of Mrs. Bailey in recognition of the contribution she had made in enabling him to serve the Federation in the way he had done.

Mr. C. H. Stafford, general manager of the Leicester City Transport Department, has had his salary increased from £1,250 to £1,450 by two annual increments of £100.

The Sheffield Corporation Transport Committee has recommended the City Council to approve the appointment of a deputy general manager of the Transport Department at a salary of £1,000 per annum. This is a new position.

Mr. F. E. Meredith, A.M.I.E.E., meter superintendent to the Sheffield Corporation Electricity Department since 1911, retired last week, after completing forty-one years of service with the undertaking. At a farewell gathering, Mr. R. H. Coates, technical assistant, in making a presentation on behalf of the staff, paid tribute to the substantial contribution he had made in the development of the Sheffield undertaking and said that the mass of research and learning now available for electrical engineers was largely acquired by the efforts and inventiveness of such pioneers of the industry. Mr. J. R. Struthers, chief engineer and general manager, stressed the outstanding qualities of Mr. Meredith and regretted his loss to the Department.

Dundee Lord Provost's Committee has received a request from **Mr. R. Taylor,** general manager of the Transport Department, asking that his present basic salary be increased to £850 and thereafter by instalments to £1,000.

Penmaenmawr Urban District Council has increased the salary of its electrical engineer, **Mr. E. Smith,** from £300 to £350 per annum.

Mr. A. M. Hicks has been appointed general manager of Siemens Electric Lamps & Supplies, Ltd., and **Mr. C. J. N. Borg** deputy general manager of the company. Mr. Hicks will continue to hold his office of secretary and Mr. Borg that of assistant secretary.

Mr. C. N. Simpson, general manager of the Gatineau Power Co., was recently elected vice-president and general manager of the company. He supervised power developments on the Gatineau River from 1926 to 1928, becoming chief engineer in 1929 and general manager in 1935.

Mr. A. Sim has resigned his position as chairman and director of Vactric, Ltd., Apex-Vactric, Ltd., and Underwood (Electric), Ltd.

Major A. T. Harpham, chief engineer, Posts and Telegraphs Department, Southern Rhodesia, has been appointed to succeed as Postmaster-General of the Colony **Mr. W. A. Bichard,** who retires in November.

Mr. H. P. Moss, Controller of Electricity in Australia, and **Mr. B. Woodfull,** city electrical engineer, Melbourne, have been appointed members of a committee to inquire into and report on the development of electricity in South Australia.

Mr. Reginald Woods, M.I.E.E., who at present holds an important executive position in the Ministry of Aircraft Production, has been appointed managing director of the General Cable Manufacturing Co., Ltd.

Barrow-in-Furness Corporation Electricity Committee reports the resignation of **Mr. E. L. Tapson,** assistant mains engineer, who has obtained an appointment with the West Gloucester Power Co., and of **Mr. A. Whyte,** charge engineer, who has taken up the appointment of deputy station superintendent in one of the West Midlands Joint Electricity Authority's power stations.

Obituary

Mr. Robert Kelly, a member of the staff of the Newcastle-on-Tyne Corporation Transport Department, died suddenly at Middlesbrough at the age of forty-eight. Mr. Kelly was president of the Association of Supervisory Staffs and Engineering Technicians and in this capacity was investigating the causes of a strike when he collapsed and died.

Coal Dump Heating

Precautions Which Should be Taken

By Colonel Harold Mitchell, J.P., D.L., M.P. (*Chairman, Alloa Coal Co.*)

WHETHER coal is stored in sheds, bunkers, or on open ground, it can be said, broadly, that self-heating occurs in the fine coal and dust in a stack, and is attributable to oxidation—combination of oxygen from the air with the coal.

The precautions to be taken in storing coal vary with the liability to spontaneous heating. Anthracites are generally free from self-heating. Hard steam coals are, to a small extent, liable, while with many of the soft bituminous coals the utmost care is necessary. A mixture of fine coal with lump coal provides conditions which are especially dangerous.

The ideal system of storing coal, and the one which obviates all difficulties, is to store it under water and so completely exclude the oxygen. The opposite extreme may be taken, and free ventilation allowed to facilitate the escape of heat generated and so avoid its accumulation to actual combustion point. The depth of coal in a heap must be limited. With some coals the height should not exceed 6 ft., and at no times should it exceed 12 ft.

The risk of fires in coal stacks varies with the nature of the coal and shape and size of the stack. This article contains some useful notes on these two aspects and suggests means of detecting and combating overheating.

In stacking there are a few elementary precautions which should be taken. Whether in the open or under cover, ground on which any coal is built should be clean and dry, and on no account strewn with rubbish (vegetable matter, oily waste, etc.) that is itself liable to spontaneous heating. Also to be avoided is the stacking of coal near or against any source of heat, such as a boiler house or flue. Above all, great care should be taken to avoid the formation of fine coal or dust.

Shape and Size of Stacks

Where possible, stacks should be built in an oblong shape and a clear roadway of at least 10 ft. left round them to facilitate their being rapidly cut into in order to isolate any heated or burning portion. The size of the stacks should be determined according to the physical condition of the coal. Nuts, cobbles and round coal (excluding fines) in the same heap can be stored pretty safely, though the amount should not exceed 200 tons, nor the height of the stack 10 ft. More risky are such coals as fines, slack, run-of-mine (alone or with larger coal), small coal which has been broken during its transportation and handling, freshly - wrought coal, soft and bright coal, bituminous and sub-bituminous and lignite coal.

Coal users to-day cannot always be fastidious about quality; to a great extent they have to take what they can get, when they can get it. Many smaller industrial users will, therefore, be glad to know that the risk of spontaneous heating in small stacks (200 tons or under) is not great.

Where stacks are large (anything up to 4,000 tons of coal and dross, and up to 2,000 tons of dross alone), metal tubes, 2 to 3 in. in diameter, should be inserted in the stacks at intervals of not more than 20 ft. Down these a thermometer should be lowered daily and three readings taken in each, near the bottom, near the top, and midway. It should be the duty of the person making the tests to keep records of these readings, and when a temperature is observed of more than 75 deg. F., with a tendency to rise, immediate action should be taken to channel the stack.

Opinion is not unanimous on the danger point. But prompt action at 75 or 80 deg. might save most of the coal. It might be too late if nothing were done before the thermometer registers 80 or 90 deg. Projecting ends of the tubes or rods can be painted to indicate the condition of various parts of the stack. Paint green, for example, the ends of the tubes where the temperature is normal, yellow where there is a rising tendency, and red where action must be taken.

On no account believe that a heating-up spot will, of itself, abate if left alone. Heating increases the pace of oxidation, so that the action gathers speed until, at 400–600 deg. F., actual combustion gets well under way.

Many authorities warn against the application of water at the first stages of such a fire, on the ground that water becomes steam, which, in contact with incandescent carbonaceous matter, produces inflammable gases —hydrogen and poisonous carbon monoxide. The injection of CO_2 down the temperature testing pipes has been tried, but, though a heavy gas, it has proved ineffectual, probably because the strong up-draught caused by the heat has expelled the gas and prevented it from permeating the stack.

The manager of a gas-works has put forward this method of meeting the situation:

Steel tubes (2 in. dia.) are hung in the coal store before coal is deposited. These reach to the heart of the heap when it is lying ready for use. Steel rods are inserted into the tubes, and are withdrawn and felt once a week. If these rods show hand heat the coal is at once worked out towards the danger zone, but as the daily coal demand is only 150 tons, it may be several days before the seat of the trouble is reached. So sometimes, before the fire can be grappled with, a large heap of coal, 150 to 600 tons, is well alight. At this point the tubes come in. Down them a large quantity of sulphuric acid is poured, followed at once by two gallons of saturated solution of sodium carbonate. The immediate result is a fierce production of CO_2, which smothers the very heart of the danger zone. This materially reduces the spreading of the fire and sometimes completely quells it.

Nevertheless, the only sure cure is to dig the fire, or affected coal, right out, which almost always means the employment of masked men and many anxious days and nights for the management staff. Water, far from being an aid, is a great mistake. The steam formed causes an updraught, and tends to encourage the fire, but a water spray is used to keep down the flames when operations arrive at that stage.

It is because this digging out, either by manual labour or by grab or scraper, is essential that I have strongly recommended stacking in small lots wherever practicable.

Industrial Wages

Advances During War Period

AN indication of the extent to which wages have risen since the beginning of the war is given in a survey published in the June issue of the *Ministry of Labour Gazette*. It is based on particulars supplied by over 54,000 establishments covering all branches of industry employing over 6¼ million people. In order to eliminate the effects of disparities between the numbers dealt with in each of the sixteen groups, the general averages have been recalculated on the basis of the estimated total numbers of wage earners employed in the individual industries. The earnings of women employed as part-time workers have been included on the basis of two part-time workers taken as representing one full-time worker.

A table shows that the average weekly earnings of men over 21 years of age in all classes rose from 69s 0d. in October, 1938, to 113s 9d. in January, 1943, an increase of 64·9 per cent., and those of all workers from 53s. 3d. to 87s 11d. (65·1 per cent.). In the metal, engineering and shipbuilding group the amount increased from 75s. 0d. to 131s. 6d. (75·3 per cent.) for men and from 59s. 8d. to 103s. 0d. (72·6 per cent.) for all workers. In public utility services the increases were as follows:—Men, from 63s. 1d. to 84s. 1d. (33·3 per cent.); all workers, from 59s. 8d. to 76s. 10d. (28·8 per cent.).

It has to be borne in mind that the figures given are general averages covering all classes of manual wage-earners, including unskilled workers and general labourers as well as operatives in skilled occupations, and that they represent the actual earnings, inclusive of payments for overtime, night-work, etc., and of amounts earned on piece-work or other methods of payment by results. In view of the wide variations as between different industries, in the proportions of skilled and unskilled workers and in the opportunities for extra earnings from overtime, night-work and increased output by piece-workers, the differences in average earnings should not be taken as evidence of disparities in the rates of wages prevailing in different industries for comparable classes of workpeople employed under similar conditions. Moreover, the percentage increases are affected by the changes which have taken place since 1938 in the relative proportions of men, boys, women and girls employed in various groups of industries, the proportions of men, boys and girls having declined while those of women have increased. Similarly, the percentage increases for all industries taken together include the effects of transference to the munition industries, in which earnings are relatively high, of large numbers of workers formerly employed in industries with a lower average level of earnings.

Electrical Groups

The survey includes an analysis of the metal, engineering and shipbuilding groups, and reveals that in the electrical engineering industry the average weekly earnings of men over 21 years of age in January, 1943, was 126s. 3d., an increase of 69·7 per cent. as compared with October, 1938. For youths and boys the figure was 41s. 10d. (69 per cent. increase); for women of 18 or over, 62s. 1d. (91·5 per cent.), excluding part-time workers, or counting two part-timers as one full-timer, 62s. (91·3 per cent.); girls, 34s. 8d. (79·3 per cent.); and all workers, 87s. 10d. (72·8 per cent.).

In the "electric cables, apparatus, lamps, etc." group, average weekly earnings in January, 1943, were 121s. 1d. for men (65·9 per cent. increase over October, 1938); 46s. 4d. for youths and boys (51·1 per cent.); 60s. 3d. (68·9 per cent.) for women full-time workers and 60s. (68·2 per cent.) including part-timers; 33s. 10d. for girls (62·4 per cent.); and 79s. 10d. for all workers (59·4 per cent.).

For men employed in the electrical contracting industry, the weekly earnings were 118s. 8d., a rise of 49·9 per cent. as compared with October, 1938; for youths and boys, 38s. 7d. (83 per cent. increase); and for all workers, 87s. 7d. (54·3 per cent.).

In the electricity supply industry the weekly earnings of men were 96s. 2d., an increase of 32·8 per cent. over October, 1938, and those of youths and boys, 35s. 2d. (34 per cent.). Full-time women workers earned 61s. and including part-timers, 60s. 11d. The average rate for all workers was 89s. 9d. (30·5 per cent. increase).

COMMERCE and INDUSTRY

Macclesfield Salary Debate. War Exhibitions.

Staff Salaries at Macclesfield

THERE was opposition at Macclesfield Town Council to a proposal (which was confirmed) to adjust the salaries of the outside technical staff in accordance with Class E of the National Joint Board schedule. Councillor A. Whitmore said the decision ignored business principles in overburdening the undertaking with overhead expenses. When the electricity undertaking was taken over by the ratepayers, it was intended to reduce the charges but "it turned out a rather unlucky baby."

Another councillor said the increased cost of power purchased from the C.E.B. foreshadowed increased charges. The chairman of the Electricity Committee said the Council was committed to collective bargaining in the matter of the National Joint Board scale.

Wages in the Contracting Industry

The National Joint Industrial Council for the Electrical Contracting Industry notifies us that the cost of living (war) addition to wages in the industry will be 17s. 11d. per week as from the second pay-day in July for the period covered by that pay-day. This alteration, which represents a decrease of 5d., will remain current up to and including the first pay-day in October.

Transport Workers' Wages

Applications were recently submitted on behalf of the Transport and General Workers' Union, the National Union of Railwaymen, and the National Union of General and Municipal Workers, for increases in war wages and changes in conditions of service of road passenger workers employed by the London Passenger Transport Board, the municipal undertakings, and the provincial omnibus companies in England and Wales.

After discussions within the appropriate industrial negotiating machinery, joint discussions between the representatives of all the parties have resulted in a common settlement of the claims, subject to ratification by trade unions' conferences. The decision relates to employees in the operative, maintenance and other grades of labour previously covered by transport awards or decisions and will, if ratified, take effect from the commencement of the first full pay period in July. Provision is made for an increase in the war wage of 4s. 6d. per week for adults, calculated on the hourly rate of pay, with agreed increases to other staff concerned, and is in settlement of the unions' applications for alterations in wages and improvements in conditions of service.

Brush "Wings for Victory" Result

Once again the Brush Electrical Engineering Co., Ltd., and its subsidiaries have multiplied their target figure in connection with Loughborough "Wings for Victory" week. The employees fixed a figure of £10,000, but quite early in the week the target figure was exceeded. By the end of the week they had subscribed £37,089, and the company has agreed to double the amount subscribed by finding a further £75,000, making the total over £112,000.

Electric Lamps as Essential Munitions

Like many other workers engaged in the manufacture of small components essential to the national war effort, those whose task it is to make lamps that are used in all the Services, in the Merchant Navy, in the war factories, transport vehicles and in our homes, often find it difficult to visualise how their efforts are helping to bring victory nearer. Accordingly, an exhibition showing the workers how their labours are providing vital equipment for the more aggressive machines of war was recently staged at a G.E.C. lamp works near London.

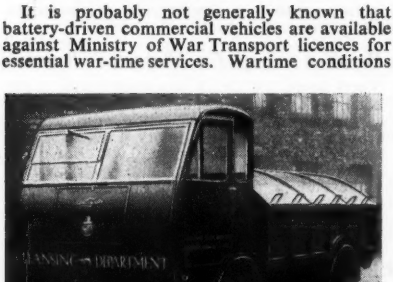
Against backcloths with photographs of men and women, machines and ships on the battle-fronts of the world, were hundreds of exhibits demonstrating in more concrete form how close is the relationship between lamps and guns, tanks, aircraft, ships, signalling devices, life-

A section of the exhibition showing a display of food for the army, a working model of pit-head gear, and 500, 1,000 and 2,000-lb. bombs

saving apparatus, coal mining equipment, etc. Speakers from the Services also gave accounts over the factory sound reproduction network of their experiences, and demonstrations were given by gun-crews of field weapons.

Electric Vehicles Essential

It is probably not generally known that battery-driven commercial vehicles are available against Ministry of War Transport licences for essential war-time services. Wartime conditions



Morrison-Electricar refuse collection vehicle recently put into service at Workington

have served to emphasise the advantages possessed by the electric vehicle for, among other things, refuse collection work. The illustration shows a Morrison-Electricar refuse collection vehicle, supplied through Graham & Roberts, Ltd., Carlisle, which was recently put into commission by the Workington Corporation. This is a heavy duty 2-ton 7-cu. yd. model with steel constructed body, having curved steel sliding doors, and is equipped with electric hydraulic tipping gear for end discharge, automatically controlled, giving a tipping angle of 45 degrees. It is powered by a Young lead acid traction battery of 40 cells, 243-Ah capacity, and is capable of 20/25 miles per charge.

Atlas Lamp Publicity

To link up to a big Press advertising campaign which is running throughout the summer, large "Atlas" lamp signs are now appearing in the big railway stations and leading thoroughfares of London and large provincial towns. The signs are all hand-painted and the little figure symbolising the "Atlas" lamp trade mark appears against a striking yellow background.

Exhibition of Army Equipment

Some idea not only of the complexity of the present-day quartermaster's task but also of the dependence of the modern army of electrical equipment is given by an exhibition which for the next two months will be on view on the "blitzed" site of John Lewis & Co., Ltd., Oxford Street, London, W.1. Although comprising 23,500 different items of equipment, these represent only a small fraction of the 3,500,000 items supplied to the Army by the Quartermaster-General at a cost of £3,000,000 a day. Apart from the automobile and tank apparatus, the electrical equipment shown includes portable generating plant; predictors for guns; radio, telegraph and telephone sets, among which is a compact "man-pack" radio unit which visitors can operate themselves; an all-electric mobile workshop containing lathe, drills, hacksaw, grinder, etc.; and a mobile laundry which, with a 6½-kW petrol-driven generator set working a washing machine, hydro-extractor, drying tumbler and drying cabinets, can deal with the underclothing of 3,000 men a week. Visitors with the help of an electrically operated mine detector can also find for themselves mines buried in the sand of a miniature desert.

Women in Industry

Many young women entering a war factory for the first time do so with some trepidation. This is recognised in many works and arrangements are made to introduce them to their strange surroundings in a tactful and human manner. The system adopted at the works of Standard Telephones & Cables, Ltd., is a good example of this kind. It is described in the June-July "Standard News" and illustrated by a progressive series of photographs. The girls upon their arrival are greeted by a gate-keeper who has been apprised of their coming and are taken to the medical department where they are given a brief inspection. They then pass to the personnel department; they are handed regulation leaflets and are photographed for "security" purposes, the photographs being affixed to their passes. They next have a friendly chat with the women's welfare officer who hands them over to a guide for a tour of the factory.

They are then given lunch in the works canteen and afterwards are conducted to their particular shops and introduced to the foremen. They spend the rest of the day watching processes and absorbing some preliminary instruction to enable them to get accustomed to their surroundings. This prepares them for starting work the next day with some degree of confidence.

South African Radio Imports

The radio goods imported into South Africa before the war came to the extent of at least 50 per cent. from the United States. In 1939, the last year for which figures have been released, the trade was worth $1,667,000 to that country. In the circumstances the progress and prospects of the radio industry which has been started in the Union are of considerable interest to American exporters, and the subject has been reported on in some detail by the U.S. Bureau of Foreign and Domestic Commerce.

When South Africa was faced with the need for specialised radio equipment, particularly for the armed forces, every component part available from imported stocks was "frozen," and listeners were forbidden to have in their possession any parts not essential for maintenance. As the result of a survey of manufacturing facilities, the nucleus of the new industry was formed by several concerns previously engaged in assembling such equipment as public-address systems and electronic control apparatus. For these and other workshops large numbers of women were engaged, including students of radio and of allied subjects from technical colleges.

The industry functions on a mass-production basis and has been successfully making trans-

mitters of various kinds, complete H.F./D.F. stations, land-mine detectors, specialised bomb-disposal apparatus, and many other kinds of radio equipment for military use. It is still necessary to import some components, but such parts as variable and fixed condensers, transformers, chokes, inductances and microphones, together with purely mechanical parts, are being made in large quantities. The report of the U.S. Bureau adds that no attempt is being made to produce receiving sets of the usual commercial types; the industry was set up to produce war equipment only.

Electricity After the War

The scope for electrical development after the war was outlined by Mr. W. Stevens, assistant general secretary of the Electrical Trades Union, in a speech at Bangor last week. Drastic changes in the industry were needed, he said. When the war was over there would be conflicts between the monopolists who wanted to extend their control over the industry and those who advocated that the supply of electricity should be a public service managed in the public interest. Until electricity became a public service rural areas would continue to be neglected, and in order to make a complete success of public control there would have to be national planning of the gas and coal-mining industry as well. This would not come about unless the common man insisted on it.

By means of electrification enormous improvements could be effected in coal miners' working conditions. In one pit with modern equipment it was expected that the output of coal would be about four times as great per month as the national average. Post-war competition of airways would compel railway companies to electrify main lines and to speed up the whole railway system. Electricity would also help the housewife; no reason existed why every new house should not have an electrical refrigerator, electrical air-conditioning system and an electrical dish-washing machine.

Motor Manufacture in Brazil

According to *Foreign Commerce Weekly*, the official medium of the U.S. Department of Commerce, the manufacture of polyphase electric motors in Brazil has made notable progress since the outbreak of war. Five companies in São Paulo are now making machines of this type to take the place of those formerly supplied by Germany, Italy and Belgium. In 1940 the São Paulo plants produced 3,393 motors valued at 1,669,500 cruzeiros; in 1942, 24,629 valued at 15,332,400 cruzeiros (£1=84 cruzeiros, approx.). This number is said to be sufficient to meet most domestic requirements, except for large units. So far as is known, single-phase motors are not now being made in Brazil. It is reported, however, that at least one company is interested in entering that field.

Linesman's Death

An inquest was held at Ringwood recently on Ernest Charles Fielder, aged twenty-nine, a linesman employed by the West Hampshire Electricity Co., Ltd., who received a fatal electric shock while testing insulators. Mr. G. T. Garwood, engineer and manager of the company, said that apparently Mr. Fielder had made an unauthorised addition to the test stick so as to avoid carrying a double extension ladder. He was an experienced linesman and the modification in the apparatus was a reasonable one, but unfortunately it was done under a misapprehension. The equipment was in Mr. Fielder's custody while the tests were in progress and it was evident that he had added a wooden pole to the rod. The technical staff of the company would not know of the modification until the apparatus was returned to the store. A verdict of "Death by misadventure" was recorded.

Key Industry Duty

The Treasury has made an Order under Section 10 (5) of the Finance Act, 1926, renewing until June 30th, 1944, the exemption from Key Industry Duty of all articles at present exempt. The Order is entitled the Safeguarding of Industries (Exemption) No. 1 Order, 1943 (S.R. & O. 1943 No. 854).

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the following British trade marks. Objections may be entered within a month from July 7th:—

PHASITRON. No. 620,991, Class 9. Phase and frequency modulation and demodulation devices; measuring and switching apparatus; distribution boards, boxes and apparatus; air and sea navigation instruments; meters, capacity and induction microphone amplifiers; and thermionic valves; all being electrical goods.—The Mervyn Sound & Vision Co., Ltd., 25, Ferry Road, Teddington, Middlesex.

PERMANOID. No. 622,636, Class 9. Insulated electric wire. Also No. 621,980, Class 17. Electrical insulating sleevings.—Associated Technical Manufacturers, Ltd., St. Vincent Street, New Islington, Manchester.

CELTINE. No. 623,112, Class 9. Electrodes for electric fusion welding.—The Quasi-Arc Co., Ltd., Grosvenor House, Park Lane, London, W.1.

INSLOT. No. B 622,197, Class 17. Electric insulating tape.—Insulating Sleevings & Tapes, Ltd., Carr Mill, Carr Street, Ramsbottom, Lancs.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but ocassionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

HAMMOND clocks. (Repairers.)

ELECTRICITY SUPPLY

Reorganisation Discussions. Charges at St. Austell.

Birkenhead.—SUPPLY TO DOCK.—The Electricity Committee is to provide a supply to premises at a dock at a cost of £748.

Birmingham.—CHAIRMAN'S VIEWS ON REORGANISATION—Speaking at last week's meeting of the City Council Alderman Sir Percival Bower, chairman of the Electric Supply Committee, said that the electrical industry would in the future have to face some scheme of reorganisation. In any such measure he would most strongly object to one set of conditions of a favourable character for company administration and another much less favourable for municipal undertakings. If the proposals meant absorption, then it must be on equal terms and not by making a sacrifice of municipal interests only.

SATISFACTORY YEAR'S WORKING.—With regard to the trading results of the Electric Supply Department for 1942-43, Sir Percival Bower said that the position was satisfactory, both financially and otherwise. Costs had risen steeply, but the Committee was glad to have got so far without any general increase in charges for electricity. He referred to the employment of women in various capacities. Nearly all the men meter readers had been replaced by women, he said, and in the generating stations women were doing an excellent job as meter testers, in the repair shops, and as assistants to the mechanical and electrical engineers.

Inverness. — HYDRO-ELECTRIC BILL. — The County Council is to approach members of the House of Lords interested in Highland development to ask their support for an amending clause in the Hydro-Electric Bill. According to the Scottish edition of the *Daily Express* this would enable the proposed control board to reimburse a local authority for loss of rates and any additional expenditure incurred while the developments suggested in the Bill were being put into effect.

Morley.—YEAR'S WORKING.—The borough electrical engineer and manager (Mr. N. Hunter) has reported to the Electricity Committee on the results of the past year's working of the undertaking. The response of the public to the fuel economy campaign was reflected in a general decline in domestic consumption, although prepayment consumers used more electricity. The accounts for the year indicated a satisfactory position and £1,000 was allocated to the general rate fund.

Newcastle-under-Lyme.—POST-WAR RECONSTRUCTION.—The subject of post-war reconstruction of the electricity supply industry was raised at last week's meeting of the Town Council when Alderman S. Myott, chairman of the Electricity Committee, reported on his attendance at the annual meetings of the Smaller Undertakings' Association and the I.M.E.A. He said that reconstruction was very much in the air at present and it was forecast that a Bill on the subject would be introduced in Parliament at an early date. They did not know what was going to be put in the Bill, but he asked the Council to pass a resolution which he said had been drafted to express their views.

The resolution, which was adopted, expressed the opinion that the primary object of any scheme of post-war reconstruction should be to secure for consumers in all areas lower and more uniform tariffs and better service. Bulk supplies should be given to all authorised undertakings at a uniform rate. Electricity supply, being a service which largely depended for its success upon the personal touch of men on the spot, should be wholly transferred to municipal ownership and control. No revolutionary or drastic change on the distribution side was either necessary or desirable.

It was decided to send copies of the resolution to the Minister of Fuel and Power, the Electricity Commissioners, local M.P.'s and all Councils owning undertakings.

Ossett.—ELECTRICITY CHARGES.—At a recent meeting of the Corporation a report was submitted on an interview with the representative of the Electrical Distribution of Yorkshire, Ltd., and it was stated that no supply rate to apply to all Corporation properties would be as economical as the existing charges, although it was possible to make a saving by transferring to different tariffs in certain premises, and such alteration had been made, as a result of which a saving of approximately 12 per cent. on the whole would be effected.

Penmaenmawr.—INCREASE WITHDRAWN.—The Urban District Council has decided to withdraw the additional charge of 15 per cent. on heating and power. Further consideration is to be given in September to the lighting charges.

Sheffield.—SUPPLY TO REFRESHMENT ROOM.—The Corporation Parks Committee is to install electricity at the refreshment room in Norfolk Park at a cost of £136.

St. Austell.—ELECTRICITY CHARGES PROTEST.—At a recent meeting of the Rural District Council it was decided to send a letter of protest to the Electricity Commissioners against the electricity charges in the district, and the St. Austell Urban and Fowey Borough Councils were invited to join in the protest. At a previous meeting of the Council it was alleged that the St. Austell & District Electric Lighting & Power Co., had sent to many consumers a letter stating that an error had been made some years ago when assessing premises for the all-purpose tariff and the company had re-measured many houses and increased the charges substantially. The Clerk of the Council said that after investigation he had come to the conclusion that the agreements which had been entered into between the company and the consumer, legally signed by both parties, were binding. He added that to safeguard its rights the company had inserted a clause reserving the right to withdraw the all-purpose tariff either generally or as regarded any particular consumer at the end of any quarter and if consumers objected the company could say that they would withdraw its all-purpose tariff and make a new agreement.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Callender's Cable & Construction Co., Ltd.—Speaking at the annual meeting on July 9th, the chairman (Sir J. Fortescue Flannery, Bt.) said that the profit for the past year was £564,042, an increase of £139,084. The company's business was world-wide and its activities naturally varied from year to year, but he emphasised that the satisfactory results were not due to fortuitous circumstances during the year but to financial prudence over a long period.

The position of the preference and ordinary stockholders had been improved by the paying off of the whole of the £300,000 of debenture stock. For twenty-three years the stockholders had received a dividend of 15 per cent., which was less than was justified by the annual results. This policy had been adopted for two reasons: to create reserves against future contingencies and to provide resources from which to pay off the debentures. Consequently the directors felt that the patience of the ordinary stockholders could now be rewarded by the addition of a cash bonus of 5 per cent. to the usual dividend, making a total of 20 per cent. for the year. The reserve for dividend equalisation would receive £50,000 (making it £500,000) and a similar amount would be put to a fund to provide additional amenities for their work-people. The balance carried forward would be £306,552.

Ruston & Hornsby, Ltd., held their annual meeting on July 8th, when Mr. G. R. Sharpley (chairman and managing director), who presided, said that they had continued their policy of conserving and building up their resources in order to meet the problems which would arise when post-war reconstruction commenced. Even assuming the post-war stabilisation of prices of raw materials, they must anticipate extensive overhauls of plant and machinery arising out of heavy depreciation due to war conditions. There was also the need for building up stocks, for granting credit facilities to impoverished buyers, and other problems. For many years export trade had represented the greater part of their business, and amongst the changed conditions after the war would be the development of internal manufacture by certain countries which had hitherto bought from them, and the repercussions as a result of certain overseas competitors having installed factories for building internal combustion engines for war purposes. By building a limited range of engines in large quantities they would be able to sell at prices at which the numerous smaller English manufacturers would be unable to compete unless the latter put their house in order. This could only be done by closer co-operation, probably by resolving themselves into groups, each firm building a limited number of sizes and types so that the complete group covered a comprehensive range such as could be dealt with by a combined export sales organisation. The problem should be viewed in the correct perspective, from the standpoint of sales first, and of manufacture afterwards.

All these problems would require considerable finance and one form of assistance which the Government could give would be to amend the basis for arriving at "standard profit." The national federations and associations, representing employers on labour questions and on those concerned with economic policy should speak with a united voice and unitedly confer with the Government on major matters of policy affecting industry, and also provide industrial representation at any international conference or on international standing committees. It was only in this way that they could ensure that this time we won the peace and that the rehabilitation of world trade was carried out in a manner fair to all and with a view to the virtual elimination of unemployment.

The Revo Electric Co., Ltd., announces a net profit of £372,451 for the year ended March 31st last, as compared with £300,001 in 1941-42. The balance available after meeting taxation, directors' fees, etc., is £72,658 (against £54,317). It is proposed to pay a final dividend of 10 per cent., with a cash bonus of 2½ per cent., making a total of 17½ per cent. for the year (same); to transfer £25,000 to general reserve; and to carry forward £92,012 (against £76,530 brought in). The company has an issued capital of £367,500 in 10s. ordinary shares.

The Harland Engineering Co., Ltd., in its accounts for 1942 shows a profit of £81,142, as compared with £91,363 for 1941. From this are deducted provision for tax and deferred repairs, £49,000, depreciation, £16,000, and directors' fees, £700, leaving a net profit of £15,432 (£16,250). Reserve receives £7,000, war damage insurance £1,207 and A.R.P. £600. As already announced, the ordinary dividend for the year is raised from 4 to 5 per cent., and the balance carried forward is £14,312 (against £14,188 brought in).

The Watford Electric & Manufacturing Co., Ltd., reports a profit for 1942 of £62,472, as compared with £41,066 for the preceding year. Tax requires £55,047, and the ordinary dividend for the year is maintained at 15 per cent. The balance carried forward is £20,443 (against £19,268 brought in).

The Swansea Improvements & Tramways Co. records a revenue for 1942 of £13,120. After bringing in £36,094, a dividend of 15 per cent. (5 per cent.) is paid, leaving £27,115 to be carried forward.

Christy Bros. & Co., Ltd., report a profit for the year ended March 31st amounting to £58,872, with employees' bonuses totalling £11,250. In the previous year the profit was £33,444 with undisclosed directors' and employees' bonuses. Dividends on investments £19,793 (£19,794) bring the total to £67,415 (£53,238), while tax provision requires £32,140 (£8,608), reserve for future taxation £17,000 (nil), loan interest £1,097 (£1,963), employees' superannuation £2,000 (same), preference dividends £2,250 net (£4,500 gross), and first and final dividend on ordinary 12½ per cent. less tax (same) £9,375 net (£18,750 gross).

General reserve receives £10,000 (£15,000) and £19,312 (£25,759) is carried forward. The report states that the volume of work in hand in all departments is satisfactory.

The Yorktown (Camberley) & District Gas & Electricity Co. is paying an interim dividend of 2¾ per cent. (3 per cent.) on its 5 per cent. standard ordinary shares.

The Palestine Electric Corporation, Ltd., reports a gross revenue of £P1,055,964 for 1942 (as compared with £846,503 for 1941). The net profit amounted to £132,785, after providing for depreciation and tax liability. The ordinary dividend is raised from 4 to 5 per cent., free of tax, £20,000 is transferred to war emergency reserve and £87,271 (against £83,955) is carried forward.

Ward & Goldstone, Ltd., are paying a final ordinary dividend of 10 per cent., maintaining the year's distribution at 20 per cent.

Ultra Electric (Holdings), Ltd., has declared a dividend of 10 per cent. for the past year (against nil).

The Telegraph Construction and Maintenance Co., Ltd., is paying an interim dividend of 5 per cent.

The Traction and General Investment Trust, Ltd., is maintaining its interim dividend at 2 per cent.

New Companies

John Riley & Son (Electrical), Ltd.—Private company. Registered July 7th. Objects: To acquire the business of electrical wholesalers carried on at 281-283, Attercliffe Common, Sheffield, as John Riley & Son, and to carry on the business of wholesale suppliers and factors of electrical, radio and general manufactured apparatus, parts and accessories, etc. Directors: J. Riley, 305, Ringinglow Road, Sheffield; and H. Riley and Winifred G. Riley, both of 9, Broad Elms Lane, Sheffield. Registered office: 281-283, Attercliffe Common, Sheffield.

Wholesale Supplies (Birmingham), Ltd.—Private company. Registered June 25th. Capital, £500. Objects: To carry on the business of manufacturers and assemblers of, and dealers in, torches, batteries, radio, television and electrical equipment, etc. Directors: F. W. Bodger and Mrs. S. M. Bodger, both of Buckley Gate, Halifax and two others. Office: Lombard House, Great Charles Street, Birmingham, 3.

Chesters (New Brighton), Ltd.—Private company. Registered July 2nd. Capital, £2,000. Objects: To carry on the business of electricians, contractors, electrical, mechanical and radio engineers, manufacturers of, and dealers in, cinematograph and wireless apparatus, etc. Directors: Mary M. Chesters and A. G. Chesters, both of 54, St. George's Park, Wallasey, Ches.; and C. G. Kynaston, 7, Fernhill, Wallasey, Ches. Registered office: 139, Victoria Road, New Brighton, Wallasey, Ches.

Riley Electrical Engineering (Hull), Ltd.—Private company. Registered July 3rd. Capital, £500. Objects: To carry on the business of electrical, wireless, telephone, lighting, heating, motor and general engineers, etc. Directors: W. H. Riley, 40, Imperial Close, N. Harrow, Middlesex; V. Riley, 8, Westland Road, Hull; J. Riley, 4, Mancklin Avenue, Hull; and Rose L. Riley, 40, Imperial Close, N. Harrow. Registered office: 40, Imperial Close, N. Harrow.

Dawn Products, Ltd.—Private company. Registered June 26th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, electric batteries, torch batteries, torches, electrical and radio apparatus and accessories, electrical fittings, etc. Directors: Margaret Blow, 43, Queen's Avenue, Muswell Road, N.10 and Dorothy A. Hirons, 251, Hampton Road, Ilford, Essex. Registered office: 158, Bishopsgate, E.C.2.

Longworth Scientific Instrument Co., Ltd.—Private company. Registered July 5th. Capital, £1,500. Objects: To carry on the business of makers and suppliers of instruments and appliances for the deaf, surgical, dental, optical, electrical, chemical and scientific instruments, X-ray and electrical treatment apparatus, etc. Permanent directors: J. T. Cox, 370, Marston Road, F. H. Gardner, 24, St. Paul's Crescent, Botley and W. G. Marriott, 14, Arthray Road, Botley, all Oxford. Registered office: 14a, Longworth Road, Oxford.

Companies to be Struck Off Register

The following companies will be struck off the Register at the expiration of three months from July 9th unless cause is shown to the contrary.—Electro Home Utilities, Ltd.; Industries Radio, Ltd.; and Therap Ray, Ltd.

Mortgages and Charges

Electric Clock Service, Ltd.—Satisfaction in full on June 21st, of debenture dated August 15th, 1941, and registered August 19th, 1941, securing £500.

Liquidations

The Public Service Transport Association.—Particulars of claims to the liquidator, Mr. E. D. Croft, Brettenham House, Lancaster Place, Strand, London, W.C.2.

As we have already reported this Association has been merged with the Omnibus Owners' Association in the recently formed Public Transport Association, Inc.

Bankruptcies

E. S. Cheatle, radio and electrical dealer, lately trading as Apex Radio & Electrical Service, 580, Coventry Road, Small Heath, Birmingham.—Trustee, Mr. R. K. Clark, Official Receiver, Somerset House, 37, Temple Street, Birmingham, released July 5th.

J. Cameroff, electrical engineer, trading as J. Cameron, 43, Camp Road, Leeds.—Supplemental dividend of 6s. 5½d. payable July 29th at the Official Receiver's office, 24a, Bond Street, Leeds.

A. King, wireless and electrical dealer, 6, Beresford Square, Woolwich, London, S.E.18.—Order made June 7th, refusing bankrupt's discharge.

E. M. Jones, electrical engineer, 26, Eastgate, Aberystwyth.—Last day for receiving proofs for dividend July 16th. Trustee, Mr. H. W. Thomas, 4, Queen Street, Carmarthen, Official Receiver.

STOCKS AND SHARES

TUESDAY EVENING.

AFTER being a dull and uninteresting market for two or three months, British Government and gilt-edged stocks have developed a brighter disposition. This has had the usual effect of infusing greater cheerfulness into investment securities as a whole. Led by the War Loan, other investment issues went ahead. The 6 per cent. preference shares of Home electricity supply companies, vulnerable as their prices now seem to be at 50 to 55 per cent. premium above the nominal values, are nevertheless again in request. For industrial ordinary shares of good class, there is once more a steady stream of buyers. Business comes patchily in most of the markets. It may be said, however, that the majority of Stock Exchange members find their energies fairly fully occupied.

Home Railway Position

Apparently it cannot be too often repeated that wage increases or other advances in working costs make no present difference to the profits of Home Railway companies, or to the dividends which they will pay. The railways are earning far more money than the Government pays them under its guarantee. This state of affairs will last, it is safe to assume, for at least twelve months after the war. Meanwhile, most of the junior stocks yield high interest at to-day's prices, and capital begins to turn towards the market as being the principal one where good returns are obtainable. Only the uncertainties of post-war politics are now deterring many people from putting money into the stocks. London Passenger Transport " C " is exceptional in the comparative modesty of the income, £4 16s. per cent., that it returns. Holders look to London's after-war transport for their reward in substantial dividend expansion. Southern Railway preferred is 10s. better at 76¼.

Callender's

Ordinary shares in the market for manufacturing and equipment present a firm front, and a noticeable recovery has occurred in Callender's. The price experienced a sharp rise on the increase from 15 to 20 per cent. in the dividend, and then went back three or four shillings upon the appearance of a few sellers who evidently thought it well to take advantage of the unexpected improvement. Three or four thousand shares came to market, and, in spite of the favourable comparison made by the yield on the shares as against that obtainable from British Insulated and Henley's, the relatively small number of shares took a week or two before they became placed. Once, however, these shares had secured a home, the price promptly recovered, and at 95s. is now up to the peak quotation touched on the increase in the dividend, making allowance for the recent deduction of the dividend of 1s. 6d. per share net.

Movements in Prices

British Vacuum Cleaner responded with a further rise of 1s. to the increase in the dividend. The price, 26s., is xd. Telegraph Constructions are 1s. harder at 52s. Telephone Condenser 10s. shares have gone up 2s. 6d. to 18s. 9d. Vactric 5s. shares at 13s. 6d. show a gain of 1s. Telephone " Props " and Manufacturing are both better. Other fluctuations are mostly slight. Tube Investments, Babcock & Wilcox and Vickers lost small amounts. Electric Constructions, which enjoyed a good rise on the increased dividend, reacted to 47s. 6d. Electric & Musical Industries, after hardening to 24s. 3d., reverted to 23s. 9d. Ward & Goldstone are ⅛ up at 23s. 9d. Stone Lighting & Radio at 4s. 9d. and Watford Electrics at 5s. have respectively lost and gained 3d. a share. Optimistic anticipation of the forthcoming Cossor figures lifted the price to 22s. 6d., but it soon went back again to 22s. In a number of interesting reports that have recently appeared, the toll taken upon profits by wartime taxation is the common, as it is the predominant, factor.

Brazilian and Argentine

Brazilian Tractions had a sharp drop from 33½ to 30, upon receipt in this country of a cabled summary of the speech made by the president at the meeting on June 29th last. Sir Herbert Couzens in this speech referred, according to the cabled report, to over-optimisim which, he said, has been apparent from time to time, and which was due to the failure to realise fully some of the abnormal conditions arising from the war. This note of caution evidently shook the nerves of people who have been following Brazilian Tractions as a healthy dollar gamble, and who had been looking for a further early increase in the dividend. Closer examination of the president's speech led to the assumption that the fall had been overdone, and a rally ensued to 31¼. This turned out to be short-lived, and the shares went back to 30½. Anglo-Argentine Tramways are dull: the company's 4 per cent. income stock has gone back to 10.

An Investment Selection

Brush Electrical Engineering 5s. ordinary shares at 8s., the price at which 5,000 are obtainable in the market, give a return of 5 per cent. on the money, assuming the dividend to be 8 per cent. as last paid. This is a good yield for shares of the Brush class. There are not many which give more than a

(*Continued on page* 93)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend: Previous	Dividend: Last	Middle Price July 12	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	56/6	..	4 6 10
British Power and Light	6	7	31/–	..	4 10 4
City of London	7	7	29/6	..	4 15 0
Clyde Valley	8	8	39/–	..	4 2 0
County of London	8	8	39/–	..	4 2 0
Edmundson's:					
7% Pref.	7	7	34/–	..	4 2 4
Ord.	6	6	28/6	..	4 4 3
Elec.Dis.Yorkshire	9	9	44/6	..	4 1 0
Elec. Fin. and Securities	12½	12½	52/–	..	4 16 1
Elec. Supply Corporation	10	10	46/–	..	4 7 0
Isle of Thanet	2	Nil	17/–	..	—
Lancs. Light and Power	7½	7½	34/6	..	4 7 0
Llanelly Elec.	5½	6	26/–	..	4 12 4
Lond.Assoc.Electric	4	3	22/–	..	2 14 10
London Electric	6	6	26/6	..	4 10 7
London Power Red. Deb.	5	5	104½	..	4 15 7
Metropolitan E.S.	8	8	40/–	+1/–	4 0 0
Midland Counties	8	8	38/–	..	4 4 2
Mid. Elec. Power	9	9	42/6	..	4 4 9
Newcastle Elec.	7	7	31/–	..	4 10 5
North Eastern Elec.:					
Ordinary	7	7	32/–	..	4 7 6
7% Pref.	7	7	34/–	..	4 2 4
Northampton	10	10	47/6	..	4 4 0
Notting Hill 6% Pref. (£10)	6	Nil	10	..	—
Northmet Power:					
Ordinary	7	7	36/6	..	3 16 8
6% Pref.	6	6	30/6	−6d.	3 18 8
Richmond Elec.	6	6	26/–	..	4 12 4
Scottish Power	8	8	37/6	..	4 5 4
Southern Areas	5	5	22/6	..	4 9 0
South London	7	7	26/–	..	5 7 8
West Devon	5	5	23/–	..	4 7 0
West Glos.	4½	3½	23/6	+6d.	2 19 7
Yorkshire Elec.	8	8	39/6	..	4 1 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	5/6	..	—
Calcutta Elec.	7*	6*	38/–	..	3 3 0
Cawnpore Elec.	10	10	32/–	..	6 5 0
East African Power	7	7	32/6	..	4 6 2
Jerusalem Elec.	7	5	28/6	..	3 10 2
Kalgoorlie (10/–)	5	5	9/–	..	5 11 1
Madras Elec.	6*	4*	24/6	..	—
Montreal Power	1½	1½	28½	..	5 5 5
Palestine Elec."A"	4*	5*	43/6	+3d.	2 6 0
Perak Hydro-elec.	6	7	9/6	+6d.	—
Shawinigan Power	83cts.	90cts.	20	..	—
Tokyo Elec. 6%	6	6	20	..	—
VictoriaFallsPower	15	15	4½	..	3 12 9
WhitehallInv.Pref.	—	—	25/–	..	4 16 1

Company	Dividend: Previous	Dividend: Last	Middle Price July 12	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity:					
1955–60 (Civil Defence)	—	3	100	..	3 0 0
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	103½	..	3 7 8
1974–94	3½	3½	100	−1	3 5 0
London Elec. Trans. Ltd.	2½	2½	96½	..	2 11 10
London & Home Counties 1955–75	4½	4½	110	..	4 1 10
Lond.Pass.Trans.:					
A	4½	4½	116½	..	3 17 3
B	5	5	115½	..	4 6 7
C	2⅞	3	62½	+1	4 16 0
WestMidlandsJ.E.A. 1948–68	5	5	110	..	4 11 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	113½	+1	5 5 9
Def.	1½	1½	28	..	5 7 2
Anglo-Portuguese	8	8	24/6	+6d.	6 10 8
Cable & Wireless:					
5½ Pref.	5½	5½	114	+2	4 16 6
Ord.	4	4	77	+1½	5 4 0
CanadianMarconi	$1 Nil	4cts.	10/6	..	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	34/–	..	2 18 10
Pref.	6	6	28/9	..	4 3 6
Great Northern Tel. (£10)	Nil	Nil	24	..	—
Inter. Tel. & Tel.	Nil	Nil	17	..	—
Marconi-Marine	7½	7½	32/6	−6d.	4 12 4
Oriental Tel. Ord.	16	10	42/3	+6d.	—
Telephone Props.	6	Nil	14/3	+6d.	—
Tele.Rentals (5/–)	10	10	11/–	..	4 11 0
Traction and Transport					
Anglo-Arg. Trans.:					
First Pref. (£5)	Nil	Nil	4/6	..	—
4% Inc.	Nil	Nil	10	−1	—
Brit.Elec.Traction:					
Def. Ord.	45	45	1075	..	4 3 9
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	10	10	50/–	..	4 0 0
Brazil Traction	$¼	$1	30¼	−1¾	—
Calcutta Trams.	8	5½	42/3	−1/6	2 12 3
Cape Elec. Trams	5	6	25/6	..	4 14 0
Lancs. Transport	10	10	44/3	..	4 10 4
Mexican Light:					
1st Bonds	5	5	107½	..	4-13 0
Rio 5% Bonds	5	5	104½	..	4 15 9
Southern Rly.:					
5% Prefd.	5	5	76½	+½	6 10 7
5% Pref.	5	5	111½	..	4 9 8
T. Tilling	10	10	54/–	..	3 14 0
West Riding	10	10	43/6	..	4 12 0

(Continued on next page)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price July 12	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron Elec. Ord...	7½	10	41/3	..	4 17 0
Assoc. Elec.:					
Ord.	10	10	48/6	..	4 2 2
Pref.	8	8	39/–	..	4 2 2
AutomaticTel.&Tel.	12½	12½	56/–	..	4 9 3
Babcock & Wilcox	11	11	47/–	–1/–	4 13 7
British Aluminium	10	10	48/6	..	4 2 6
British Insul. Ord.	20	20	5¼	–⅛	3 18 2
British Thermostat (5/–)	18½	18½	17/6	..	5 5 9
British Vac.Cleaner (5/–)	15	30	26/–xd	+⅛	5 15 5
Brush Ord. (5/–)	6	8	8/–	..	5 0 0
Burco (5/–) ..	15	15	14/3	..	5 5 1
Callender's ..	15	20	95/–	+2/3	4 4 2
ChlorideElec.Storage	15	15	81/3	–⅛	3 14 0
Cole, E. K. (5/–)	7	10	23/–	..	2 3 6
Consolidated Signal	17	24	5⅛	..	4 8 3
Cossor, A. C. (5/–)	15	10*	22/–	..	1 14 1
Crabtree (10/–/..	17½	17½	38/–	..	4 12 4
Crompton Parkinson Ord. (5/–) ..	20	20	25/–	..	4 0 0
E.M.I. (10/–) ..	6	6	23/9	–3d.	2 10 7
Elec. Construction	10	12½	47/6	–1/–	5 5 3
Enfield Cable Ord.	12½	12½	55/6	..	4 10 1
Elecl. Switchgear (10/–)	10	10	20/–	..	5 0 0
English Electric	10	10	48/–	..	4 3 4
Ensign Lamps (5/–)	25	25	21/3	..	5 17 8
Ericsson Tel. (5/–)	22†	20†	47/6	..	2 2 2
Ever Ready (5/–)	40	40	37/6	..	5 6 8
Falk Stadelmann	7½	7½	31/–	..	4 16 9
Ferranti Pref. ..	7	7	28/9	..	4 17 5
G.E.C.: Pref. ..	6½	6½	33/–	..	3 18 9
„ Ord. ..	17½	17½	88/6	..	3 19 2
Greenwood&Batley	15	15	40/–	..	7 10 0
HallTelephone(10/–)	12½	12½	25/3	..	4 19 0
Henley's (5/–) ..	20	20	24/3	..	4 2 2
4½% Pref. ..	4½	4½	23/–	..	3 18 3
Hopkinsons ..	15	17½	63/9	..	5 9 9
India Rubber Pref.	5½	5½	21/–	..	5 4 9
Intl. Combustion	30	30	6½xd	+1/–	4 17 10
Johnson & Phillips	15	15	69/–	..	4 7 2
Lancashire Dynamo	20	22½	91/3	..	4 18 9
Laurence, Scott (5/–)	15	12½	12/–	..	5 4 2
London Elec. Wire	7½	7½	31/6	..	4 15 3
Mather & Platt ..	10	10	48/9	..	4 2 0
Met.Elec.CablePref.	5½	5½	21/3	..	5 3 6
Murex	20	20	5	..	4 0 0
Pye Deferred (5/–)	25	25	22/6	..	5 11 1
Revo (10/–) ..	17½	17½	37/–	..	4 14 7
Reyrolle.. ..	12½	12½	67/6	..	3 14 0
Siemens Ord. ..	7½	7½	30/3	+3d.	4 19 2
Strand Elec. (5/–)	4	7½	7/3	–3d.	5 3 5
Switchgear & Cowans (5/–) ..	10	20	15/6	..	6 9 0
T.C.C. (10/–) ..	5	5	18/9	+¼	2 13 4
T.C. & M. ..	10	10	52/–	+1/–	3 17 0
TelephoneMfg.(5/–)	9	9	12/–	+3d.	3 15 0
Thorn Elec. (5/–)	20	20	21/6	..	4 13 1
Tube Investments	20	20	91/–	–6d.	4 8 0
Vactric (5/–) ..	Nil	Nil	13/6	+1/–	—
Vickers (10/–) ..	10	10	18/6	–3d.	5 8 1
WalsallConduits(4/–)	55	55	43/6	..	5 1 2
Ward & Goldstone (5/–)	20	20	23/9	+⅛	4 4 2
WestinghouseBrake	10	12½	62/6	..	4 0 0
West, Allen (5/–)	7½	7½	7/6	..	5 0 0

* 5 per cent. tax-free. † Dividends free of Income Tax.

Stocks and Shares (*Continued from page* 91)

trifle over 4½ per cent. on the money. Lancashire Dynamo ordinary can be bought at 93s., paying £4 16s. 9d. per cent. on the basis of the increased dividend of 22½ per cent. Walsall Conduits 4s. ordinary shares have come on offer at 44s. 6d., affording £4 18s. 9d. per cent. on the dividend of 55 per cent. which the company has now paid annually for several years. English Electric can be bought, as to 5,000 shares, at 48s. 6d. to pay £4 2s. 6d.; the dividend is due in March. A few thousand Power Securities ordinary shares have come in at 26s. 6d., giving 4½ per cent. on the 6 per cent. dividend which the company has distributed in each of the past three years. Lancashire United Transport ordinary at 45s. 6d. give £4 7s. 9d., and Associated Electrical Industries ordinary on the 10 per cent. dividend which has become a regular payment, return £4 0s. 9d. per cent. at the present price of 49s. 6d.

Cable & Wireless

While there is not a great deal of business going on in Cable & Wireless ordinary stock, the degree of notice paid to this issue is still very attentive. People are asking every day in the Stock Exchange market whether the price has got down to a level at which the stock is worth buying as an investment that gives a living rate of income on the money. At 77, Cable & Wireless ordinary stock pays £5 4s. per cent.

From what has recently transpired from reports and meetings, the 4 per cent. dividend on the ordinary stock would seem likely to become stabilised for the period of the war. The figures for the past year when published a fortnight ago gave legitimate ground for disappointment. But the earnings of the current twelvemonth should make a better showing, and produce profits which will amply cover a 4 per cent. dividend on the ordinary stock.

Therefore while Cable & Wireless ordinary is not yet to be ranked with first-class investments, the employment of money in the stock may reasonably be regarded as judicious. There may be no particular reason for anticipation of an early improvement in the price, but the latter is modest enough to warrant inclusion of the stock amongst other investments for the sake of raising the average yield.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AKTIEBOLAGET Electrolux.—"Vacuum cleaners." 3649/42. May 5th, 1941. (554177.)

Allmänna Svenska Elektriska Aktiebolaget.—"Arrangement in electric differential potential devices." 5044/42. May 5th, 1941. (554210.)

Arc Manufacturing Co., Ltd., G. Haim and E. J. Rogers.—"Welding rods or electrodes." 16628. December 24th, 1941. (554239.)

Automatic Telephone & Electric Co., Ltd., S. H. Oliver and D. Wright.—"Telephone systems." 16335. December 18th, 1941. (554137.)

Automatic Telephone & Electric Co., Ltd., O. A. Pearce and S. H. Oliver.—"Telephone systems." 16334. December 18th, 1941. (554136.)

G. J. C. Ball.—"Machine or apparatus for splitting or opening the covering or sheathing of cables and the like." 1334. February 2, 1942. (554257.)

G. J. Berry.—"Imitation fuel for electric fires." 944. January 22nd, 1942. (554256.)

T. Bolton & Sons, Ltd., J. W. Wood and T. Bridgett.—"Dies for the drawing of bar, tube, rod or strip." 6677. May 18th, 1942. (554215.)

British Insulated Cables, Ltd., G. H. Walton, J. C. Quayle and P. Jones.—"Machine for covering wire with insulating material." 2487. February 25th, 1942. (554176.)

British Thomson - Houston Co., Ltd.—"Synthetic resins." 8619/41. July 10th, 1940. (554121.) "Apparatus for producing alternating voltages of peaked wave form." 613/42. January 16th, 1941. (554144.) "High-frequency electron discharge devices." 17017/42 August 16th, 1941. (Divided out of 552672.) (Convention date not granted.) (554154.) "Resinous condensation products." 13565/41. October 26th, 1940. (554195.) "Thermal electric switches." 14783/42. October 21st, 1941. (554219.) "Circuits controlled by variable reactors." 15942/42. November 18th, 1941. (554221.) "Starting means for electric discharge systems." 17067/42. December 6th, 1941. (554225.)

British Thomson-Houston Co., Ltd. (General Electric Co.). "Resinous condensation products." 13684. October 24th, 1941. (554196.)

British Thomson-Houston Co., Ltd., F. Widnall and F. W. Thorpe.—"Electric lighting fittings." 16138. December 15th, 1941. (554130.)

Delco-Remy and Hyatt, Ltd., and B. Rushton.—"Terminal connector for electrical conductors." 1719. February 10th, 1942. (554258).

Foster Transformers and Switchgear, Ltd., and F. Morris.—"Snap-action electrical switches." 2926. March 6th, 1942. (554207.)

Foster Wheeler, Ltd.—"Apparatus for generating and superheating steam." 16179/42. November 22nd, 1941. (Addition to 546267.) 554222.) "Apparatus for generating and superheating steam." 16180/42. November 25th, 1941. (Addition to 546267.) (554223.)

W. T. Henley's Telegraph Works Co., Ltd., and W. A. T. Crowe.—"Underground disconnecting box for electric cables." 696. January 16th, 1942. (554255.)

Marconi's Wireless Telegraph Co., Ltd.—"Travelling wave aerials." 12331/41. September 24th, 1940. (554190.)

Marconi's Wireless Telegraph Co., Ltd. (Radio Corporation of America).—"Television systems." 5837. April 30th, 1942. (554281.)

Parsons Marine Steam Turbine Co., Ltd., S. S. Cook and L. M. Douglas.—"Power installations." 14827. November 18th, 1941. (554128.)

Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).—"Beam-deflecting circuits for cathode-ray tubes." 376. January 9th, 1942. (554172.) "Electron-discharge devices." 16373. December 18th, 1941. (554202.)

G. H. Scholes & Co., Ltd., G. H. Scholes and F. J. Pearce.—"Electric tumbler switches." 16337. December 18th, 1941. (554234.)

Société Génevoise d'Instruments de Physique.—"Axial balance device for a body revolvable on a shaft of variable inclination." 14159/42. July 4th, 1942. (554218.)

Standard Telephones & Cables, Ltd.—"Voltage-regulating equipment." 4178/42. October 19th, 1940. (554209.) "Electric wave amplifiers of the negative feedback type." 5889/42. February 25th, 1941. (554214.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—"Systems for radio direction finding." 383. January 9th, 1942. (554251.)

Standard Telephones & Cables, Ltd., and A. A. New.—"Electric insulating material." 10656/42. October 17th, 1941. (Divided out of and addition to 546971.) (554161.)

Standard Telephones & Cables, Ltd., and H. T. Prior.—"Electrical condensers." 16400. December 19th, 1941. (554161.)

Standard Telephones & Cables, Ltd., E. M. S. McWhirter, R. H. Dunn, C. H. Chambers and F. W. Warden.—"Arrangements for indicating load variations in alternating-current supply systems." 16333. December 18th, 1941. (554135.)

A. H. Stevens (Electronic Laboratories, Inc.).—"Lamps." 8499. June 20th, 1942. (554183.)

Superheater Co., Ltd., and E. A. Robinson.—"Jointing of tubes to headers or the like." 4336. April 1st, 1942. (554278.)

W. W. Triggs (Carnegie-Illinois Steel Corporation).—"Automatic regulation of current in electroplating bath." 2625. February 27th, 1942. (554277.)

Westinghouse Electric International Co.—"Gas-blast electric circuit interrupters." 15020/42. October 24th, 1941. (554220.)

Wilson Welder & Metals Co., Inc.—"Crater elimination in arc welding." 5434 42. April 24th, 1941. (554213.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Dundee.—Corporation Cleansing Department. Traction batteries for Morrison 25 cwt. electric vehicle. Tenders to town clerk.

Orders Placed

Birkenhead.—Electricity Committee. Accepted. E.h.v. and l.v. paper insulated cables.—Britannic Electric Cable & Construction Co.; Aberdare Cables; Scottish Cables; Rubber Insulated Cables.—William Geipel; Mersey Cable Works. Meters.—English Electric Co.; Landis & Gyr.

Liverpool.—Electric Power and Lighting Committee. Recommended. Three sets of heat exchangers (comprising heat exchangers, circulating water pumps, together with pipework and valves) for erection on three turbo-alternator sets at the Clarence Dock power station (£8,700, the erection of the equipment to be carried out on a "time and expense" basis).—Metropolitan-Vickers.

Sheffield.—Electricity Committee. Accepted. Distribution cables—contract extended for twelve months.—W. T. Glover & Co.

Welfare Committee. Accepted. Battery for electric runabout (£109).—W. E. Chappell.

Transport Committee. Accepted. Lamps and cable.—R. Neill & Co. (Sheffield). Armature coils, commutators and copper rings.—P. R. Jackson & Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashby-de-la-Zouch.—Children's ward, Cottage Hospital; secretary.

Birkenhead.—Fire station extensions, Borough Road and Atherton Street; Davidson & Co.

Birmingham.—Two experimental houses and model kitchen; city engineer.

Bishop Auckland.—British Restaurant, Farr's Yard; U.D.C. surveyor.

Bournemouth.—Alterations, 141, Windham Road; J. E. Clarke & Co.

Alterations, 163-167, Old Christchurch Road; J. E. Beale, Ltd.

Bradford.—High School for Girls, Heaton Mount; J. T. Castle, city architect, Town Hall.

Bridgnorth.—Houses at Stottesdon and Monkhampton for R.D.C. (£7,694); W. Whittingham, Ltd., builders, Powlett Street, Wolverhampton.

Brighouse.—Additions to mills; G. Turner & Co., Ltd., worsted spinners, Owler Ings Road.

Bromsgrove.—School for the blind at Lickey Grange; G. H. Cuming-Butler, Royal Institution for the Blind, Harborne, Birmingham.

Camelford.—Houses, St. Clether, Minster, Michaelstow and Delabole, for R.D.C.; Andrew & Randall, Hepworth Chambers, St. Austell.

Chelmsford.—Farm workers' houses for R.D.C.; T. J. Gough, Ltd., builders, Hayes, Middlesex.

Cheltenham.—Alterations and additions to brewery; Cheltenham Original Brewery, Ltd.

Chesterfield.—Houses (75), Pottery Lane site; W. S. Wilson, Town Hall.

Chevington.—Conversion of institute into a miners' canteen; Mauchlen and Weightman, architects, Saville Row, Newcastle-on-Tyne.

Cleethorpes.—Additions to premises; R. G. Chapman, haulage contractor, 14, Sherburn Street.

Coventry.—Workmen's hostel, London Road; Salvation Army.

Downham.—Agricultural workers' houses (36), Feltwell, Southery and Methwold Hythe, for R.D.C.; C. A. E. Woolnough, architect, 8, South Brink, Wisbech.

Dumbarton.—Houses (50), Brucehill and Crosslet; burgh surveyor.

Epping.—Agricultural houses (£5,270), Epping Green, Nazeing and Magdalen Laver, for R.D.C.; Sparks & Son, builders, 72, Gloucester Road, South Kensington, London, S.W.7.

Evesham.—Houses for farm workers at Church Honeybourne and Childwickham, for R.D.C.; R. J. Atkinson, architect, 64, Port Street, Evesham.

Garstang.—British Restaurant; R.D.C. surveyor, Union offices, Garstang.

Hawarden.—Houses (£3,565), Hope and Broughton, for R.D.C.; J. W. Bostock, builder, Giversyllt, near Wrexham.

Hebburn-on-Tyne.—Extension to works; J. & W. Lowry, 50, Corporation Street, Newcastle-on-Tyne.

Herefordshire.—Senior School, Ross; county architect, County Offices, Bath Street, Hereford.

Heston and Isleworth.—British Restaurant, High Street, Hounslow; borough engineer.

Isle of Axholme.—Houses (14), Epworth, Belton, Haxey and Owston Ferry, for R.D.C.; T. H. Johnson & Son, architects, 20, Priory Place, Doncaster.

Lancaster.—Canteen at Cathedral Junior School; F. Hill, city surveyor, Town Hall.

Lunesdale.—Houses at Wray, Hornby and Whittington, for R.D.C. (£5,940); Edmondson Bros. (Morecambe), Ltd., Poulton Road, Morecambe.

Middlesbrough.—Three wartime nurseries; Cecil Gorman, borough engineer, Town Hall.

Northampton.—Hostel; Miss V. Perrin, secretary, Y.W.C.A., Midland Division, Castilian Street, Northampton.

Northamptonshire.—Remand home for girls at the Irthlingborough Public Assistance Institution; J. Perkins, county architect, County Hall, Northampton.

Ormskirk.—Pump and pump house for U.D.C. (£3,565); E. J. Wright, surveyor, Council Offices.

Ovington (Co. Durham).—Four houses for agricultural workers; R. C. Blampled, 8, Newgate, Barnard Castle.

Pocklington.—Houses, Newton-on-Derwent, North Cliffe, Shiptonthorpe, Sutton-on-Derwent and Fangfoss, for R.D.C.; Needham & Thorp, architects, 3, Duncombe Place, York.

Ponteland (Northumberland). — Hydro-extractor plant, Cottage Homes Laundry; F. Harvey, Education Offices, Northumberland Road, Newcastle-on-Tyne.

Rudheath.—Church hall, for Parochial Council; Rev. R. F. Johnson, Parish Church.

St. Helens.—Works extensions; J. Crosby & Sons, Ltd., builders, Carrwood, Hale, near Altrincham.

Scarborough.—Alterations, Pavilion Hotel, Westborough; T. H. Johnson & Son.

Sedgefield.—Houses, Sedgefield and Chilton Buildings, for R.D.C.; W. Hopps, housing architect, Council Offices, Sedgefield, Stockton-on-Tees.

Sedgley.—Transformer house; Midland Electric Corporation for Power Distribution Ltd.

Silkstone.—Mission church and hall; Vicar, All Saints' Church, Silkstone, near Barnsley.

Skelmersdale.—Sewage disposal scheme for U.D.C.; E. S. Rosbotham, surveyor, Council Offices.

Southport. — Additions, technical school (£550); borough engineer.

Startforth (Yorks).—Farm workers' houses for the R.D.C.; Page & Sons, builders, Bishop Auckland.

Stretford.—British Restaurant, Trafford Park Hotel Bowling Green, for T.C.; W. Lionel Gray (1933) Ltd., builders, Hospital Road, Farnworth, near Bolton.

Sunderland.—Canteen, office and rest room at Hendon Dock for North-Eastern Marine Eng. Co., Ltd., and stores for J. L. Thompson & Sons, Ltd.; G. T. Brown & Son, architects, Fawcett Street.

Extensions, pickle factory, for J. Humble, Fox Street; J. Duxbury, Fox Street.

Prefabricated hut, Bede Schools, for meals kitchen; education architect.

Expansion of the school meals plan; borough education architect.

Six houses for agricultural workers by Rural Council (£5,100); C. Emmerson, surveyor, R.D.C. Offices, Sunderland.

Swadlincote.—Village hall, Overseal P.C.; A. Jackson, clerk.

Tadcaster.—Houses, Askham Bryan, Colton, and South Milford, for R.D.C.; Needham & Thorp, architects, 3, Duncombe Place, York.

Tarvin.—Workers' houses (16), several sites, for R.D.C.; Thomas Pritchard, surveyor, Westminster Buildings, Newgate Street, Chester.

Tonbridge.—Houses (£3,589), Capel and Hildenborough, for R.D.C.; Jones & Harvey, builders, Sevenoaks.

Twickenham.—Day nursery, grounds of Gifford Lodge, Pope's Avenue; borough engineer, Municipal Offices.

Tynemouth.—British Restaurant, Ridges Estate, for the T.C.; borough engineer, Howard Street, North Shields.

Six bay garage for the N.F.S.; divisional officer.

Urmston.—Nursery at Cottage Hospital, Greenfield Road, for Board of Management; Leech & Ratcliffe, 7, Cheapside, Manchester, 2.

Wallsend. — Temporary fire station; W. Andrews, divisional officer, N.F.S.

Wantage.—Houses (£9,360), Blewbury, East Hendred, Sparshot and Harwell, for R.D.C.; Gilmorie, builder, Langley, Bucks.

Warrington.—Works extensions and alterations; T. J. Boswell & Sons, Ltd., ironmongers, Golborne Street.

Buildings, rear of Reliance Garage, Winwick Road; Johnson Wilde & Co., Ltd., Reliance Garage, Winwick Road.

Offices; Broadbent & Ainsworth, Sankey Street.

West Bromwich.—Clinic, Hemstead; borough engineer.

Whitby.—Farm workers' houses; R.D.C. surveyor.

Wigan.—Garage, Little Lane; Sharrock Bros., 397, Warrington Road, Wigan.

Reconstruction, motor body works; Santus Motor Body Works, Ltd., Powell Street.

Wiltshire.—Schools at Box and Chippenham; T. Walker, county architect, County Offices, Trowbridge.

Police headquarters, for C.C.; T. Walker, county architect, County Offices, Trowbridge.

Wokingham.—Houses on four sites for R.D.C.; C. Smith & Son, architects, 14, Friar Street, Reading.

Wood Green.—Factory extensions, Silsoe Road; Davis & Timmins, Ltd.

Wooler.—Extensions to hostels; R. Carse & Son, builders, 15, Prospect Road, Oldgate, Morpeth.

York.—Private wards, Infirmary; city engineer.

Additions, 65, Lawrence Street; E. F. Tomlin.

Engineer Surveyors' Association

THE Engineer Surveyors' Association held its annual conference at the County Hotel, Newcastle-on-Tyne, on June 26th, the delegates being welcomed by the Lord Mayor, Alderman Thompson, J.P.

Reference was made by speakers at the conference to the fact that although the Association was not large by comparison with similar organisations, it was at the same time of indispensable value to the whole community. Membership was composed entirely of specialists of wide experience, and who, by the very nature of their profession, must keep abreast of all technical progress, so that their knowledge could be used for the benefit of owners and users of modern highly technical plant. Their duties lay in two directions, to give protection where plant, by its own inherent potentialities was subject to certain failures (a particularly valuable feature in these days), and a lesser known but equally valuable service in protecting the public from risks attendant upon the use of high-pressure vessels, electrical plant, lifts and cranes.